



**Shock Compression of Condensed Matter**  
PORTLAND, OREGON | JUNE 2019

21st Biennial Conference of the APS Topical Group on Shock Compression  
of Condensed Matter

Portland, Oregon

<https://www.aps.org/meetings/meeting.cfm?name=SHOCK19>

**Sunday, June 16, 2019 9:15AM - 10:30AM –**  
Session 1A Energetic Materials Broadway I/II -

**9:15AM 1A.00001 Measurements of shock sensitivity in a damaged explosive using a small-scale gap test**<sup>1</sup> NICK CUMMOCK, Purdue University, CHRIS MOLEK, CHAD RUMCHIK, AFRL, STEVEN SON, Purdue University —

<sup>1</sup>Author N.R.C. wishes to acknowledge support from the Science, Mathematics and Research for Transformation (SMART) Scholarship for Service Program under grant No.2016-99534.

**9:30AM 1A.00002 Anisotropic Thermomechanical Response to Shock Wave Loading in TATB (symp)**, PUHAN ZHAO, University of Missouri, MATTHEW KROONBLAWD, Lawrence Livermore National Lab, NITHIN MATHEW, Los Alamos National Lab, TOMMY SEWELL, University of Missouri —

**9:45AM 1A.00003 Effects of Inert Additives on Cyclotrimethylene-Trinitramine (RDX)/Trinitrotoluene (TNT) Detonation Parameters to Predict Detonation Synthesis Phase Production**<sup>1</sup>, MARTIN LANGENDERFER, CATHERINE JOHNSON, WILLIAM FAHRENHOLTZ, Missouri University of Science and Technology —

<sup>1</sup>Army Research Office BAA W911NF-17-S-0002

**10:00AM 1A.00004 Spectroscopy in Deflagrating High Explosives**, SUZANNE SHEEHE, SCOTT JACKSON, Los Alamos National Laboratory —

**10:15AM 1A.00005 SYMP Ultrafast Shock Induced Mid-Infrared Vibrational Changes in Thin Film Explosives**, MICHAEL POWELL, Los Alamos National Laboratory, Purdue University, PAMELA BOWLAN, Los Alamos National Laboratory, STEVEN SON, Purdue University, CYNTHIA BOLME, KATHRYN BROWN, DAVID MOORE, MARC CAWKWELL, Los Alamos National Laboratory, ALEJANDRO STRACHAN, Purdue University, SHAWN MCGRANE, Los Alamos National Laboratory —

**Sunday, June 16, 2019 10:45AM - 12:00PM –**  
Session 1B Equation of State and Phase Transitions Broadway I/II -

**10:45AM 1B.00001 Probing the Metastability Limit of Liquid Water under Dynamic Compression (symp)**<sup>1</sup>, MICHELLE MARSHALL, MARIUS MILLOT, DAYNE FRATANUONO, PHILIP MYINT, JON BELOF, RAY SMITH, JAMES MCNANEY, Lawrence Livermore Natl Lab —

<sup>1</sup>Prepared by LLNL under Contract DE-AC52-07NA27344.

**11:00AM 1B.00002 Shock driven decomposition and reshock in PMMA**, MEGHAN K. LENTZ, JOSHUA D. COE, KIRILL VELIZHANIN, Los Alamos National Laboratory —

**11:15AM 1B.00003 Predictive simulations of metastable phases of carbon at high compression**, ASHLEY WILLIAMS, KIEN NGUYEN CONG, JONATHAN WILLMAN, University of South Florida, NIR GOLDMAN, Lawrence Livermore National Laboratory, IVAN OLEJNIK, University of South Florida —

**11:30AM 1B.00004 Hugoniot of Meso-Erythritol as an Inert Surrogate for PETN (symp)**, ZAKARY WILDE, Los Alamos National Laboratory & Arizona State University, PEDRO PERALTA, Arizona State University —

**11:45AM 1B.00005 Molecular dynamics simulations of grain interactions in shock-compressed highly-textured columnar polycrystals**, PATRICK HEIGHWAY, DAVID MCGONEGLE, University of Oxford, UK, NIGEL PARK, AWE, UK, ANDREW HIGGINBOTHAM, University of York, UK, JUSTIN WARK, University of Oxford, UK —

**Sunday, June 16, 2019 1:00PM - 2:30PM –**  
Session 1C Material Microstructure Broadway I/II -

**1:00PM 1C.00001 Mode I crack propagation in homogeneous nuclear graphite (symp.)**, ANTOINE CORNET, DAVID EASTWOOD, NEIL BOURNE, PAUL MUMMERY, University of Manchester, CARL CADY, Los Alamos National Laboratory, CHRISTOPH RAU, Diamond Light Source —

**1:15PM 1C.00002 On the Role of Texture and Precipitate Orientation in Spall Failure of a Rolled Magnesium Alloy**, DEBJOY MALLICK, Johns Hopkins University, Department of Mechanical Engineering, SUHAS ESWARAPPA-PRAMEELA, Johns Hopkins University, Department of Materials Science and Engineering, VIGNESH KANNAN, MENG ZHAO, Johns Hopkins University, Department of Mechanical Engineering, JEFF LLOYD, U.S. Army Research Laboratory, Aberdeen Proving Ground, MD, TIM WEIHS, Johns Hopkins University, Department of Materials Science and Engineering, KT RAMESH, Johns Hopkins University, Department of Mechanical Engineering —

**1:30PM 1C.00003 Effect of Microstructure on the Dynamic Behavior of UHMWPE Composites**, JASON PARKER, KT RAMESH, Johns Hopkins University —

**1:45PM 1C.00004 Impact behavior and mesostructure optimization of additively manufactured composite shielding**, LAUREN POOLE, Rice University, MANNY GONZALES, Materials and Manufacturing Directorate, Air Force Research Laboratory, MATTHEW FRENCH, WILLIAM YARBERRY, ZACHARY CORDERO, Rice University —

**2:00PM 1C.00005 In situ observation of material flow in composite media under shock compression<sup>1</sup>**, DAVID BOBER, JONATHAN LIND, MUKUL KUMAR, Lawrence Livermore National Laboratory —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

**2:15PM 1C.00006 Effect of Matrix-Filler Interface Adhesion on the Spall Strength of Particle-Reinforced Polymer Matrix Composites**, ANTON LEBAR, ANDREW ODDY, RAFAELA AGUIAR, OREN E. PETEL, Dept of Mechanical and Aerospace Engineering, Carleton University, CARLETON UNIVERSITY IMPACT RESEARCH LAB COLLABORATION —

**Sunday, June 16, 2019 2:30PM –**  
Session 1D Early Career / Student Poster Session Atrium -

**1D.00001 Commissioning of a Fiber-Coupled Equation-of-State Diagnostics Package in the UC Davis Shock Compression Lab**, MERAL BASIT, DYLAN SPAULDING, ERIK DAVIES, SARAH STEWART, University of California, Davis —

**1D.00002 Fast mid-infrared spectroscopy of gases: measurement method during a H<sub>2</sub>/O<sub>2</sub> deflagration(symp)<sup>1</sup>**, MARIE DABOS, CEA-GRAMAT, KHANH-HUNG TRAN, LEME, Paris Nanterre University, NICOLAS LECYSYN, GERARD BAUDIN, CEA-GRAMAT, MARC GENETIER, ISABELLE RANC, BRUNO SERIO, LEME, Paris Nanterre University —

<sup>1</sup>We thank the DGA for its financial support.

**1D.00003 Shock Compression/Release of Magnesium Single Crystals: Anisotropy and Time-Dependent Inelastic Response<sup>1</sup>**, PRITHA RENGANATHAN, J. M. WINEY, Y. M. GUPTA, Washington State University —

<sup>1</sup>Work supported by ARL and DOE/NNSA

**1D.00004 Mechanical and optical response of polymethylpentene under dynamic compression<sup>1</sup>**, L. M. BARMORE, M. D. KNUDSON, Washington State University —

<sup>1</sup>Work supported by DOE/NNSA

**1D.00005 Shock Compression of Graphite: Role of Orientational Order on the Graphite to Diamond Transformation (symp)<sup>1</sup>**, TRAVIS VOLZ, Y. M. GUPTA, Washington State University —

<sup>1</sup>Work supported by DOE/NNSA

**1D.00006 A comparison of Gaussian Process Classification to classical statistical methods in sensitivity tests<sup>1</sup>**, ALEX CASEY, NICK CUMMOCK, ILIAS BILIONIS, STEVEN SON, Purdue University —

<sup>1</sup>This research was conducted with Government support under and awarded by DoD, Air Force Office of Scientific Research, National Defense Science and Engineering Graduate (NDSEG) Fellowship, 32 CFR 168a

**1D.00007 Ramp Compression of Gold to 690 GPa<sup>1</sup>**, SIRUS HAN, Princeton University, JUNE WICKS, Johns Hopkins University, RAYMOND SMITH, Lawrence Livermore National Laboratory, DONGHOON KIM, Princeton University, JON EGGERT, Lawrence Livermore National Laboratory, THOMAS DUFFY, Princeton University —

<sup>1</sup>Work supported by DOE/NNSA/NLUF

**1D.00008 (symp) Shock-induced alpha-epsilon phase transformation in nanocrystalline iron: Plastic deformation and phase transitions**, HOANG-THIEN LUU, Comp. Mat. Sci./Eng., Inst. of Applied Mech., Clausthal Univ. of Tech., RAMON J. RAVELO, Physics Department and Materials Research Institute, University of Texas, El Paso, TX, 79968, USA, EDUARDO M. BRINGA, CONICET and Faculty of Engineering, University of Mendoza, Mendoza, 5500, Argentina, TIMOTHY C. GERMANN, Theoretical Division, Los Alamos National Laboratory, Los Alamos, NM, 87545, USA, NINA GUNKELMANN, Computational Material Sciences/Engineering, Institute of Applied Mechanics, Clausthal University of Technology, 38678 Clausthal-Zellerfeld, Germany —

**1D.00009 symp-Modeling the effect of plasticity and damage in -HMX single crystals under shock loading**, CAMILO DUARTE, MARISOL KOSLOWSKI, Purdue University, NICOLO GRILLI, University of Oxford —

**1D.00010 (symp) X-ray diffraction study of laser-shocked forsterite (Mg<sub>2</sub>SiO<sub>4</sub>) from 20-130 GPa<sup>1</sup>**, D. KIM, E. BERRYMAN, S. HAN, T. DUFFY, Princeton, S. TRACY, Carnegie Institution, A. GLEASON, Stanford, C. BLOME, LANL, K. APPEL, M. SCHOELMERICH, European XFEL, V. PRAKAPENKA, Uni. of Chicago, H. LEE, B. NAGLER, SLAC, R. SMITH, M. AKIN, J. EGGERT, LLNL, P. ASIMOW, Caltech —

<sup>1</sup>Work supported by DOE/FES

**1D.00011 HyFIRE: Hypervelocity Facility for Impact Research at Johns Hopkins University**, GARY SIMPSON, MATTHEW SHAEFFER, K.T. RAMESH, Johns Hopkins University —

**1D.00012 Engineered Defects in Single Crystal HMX (symp)<sup>1</sup>**, CHRISTIAN SORENSEN, CAMILO DUARTE, STEVEN SON, Purdue University —

<sup>1</sup>ONR funded MURI PCP@Xtreme

**1D.00013 Flash ignition of nanoaluminum and fluoropolymer composites.**, KYLE UHLENHAKE, METIN ORNEK, STEVEN SON, Purdue University —

**1D.00014 Investigation of non-critical pore size effects on detonation front shapes for conventional and 3D printed explosives**, GABRIEL MONTOYA, NICK CUMMOCK, MONIQUE MCCLAIN, DIANE COLLARD, STEVEN SON, Purdue University, TERRY SALYER, Los Alamos National Laboratory —

**1D.00015 Additive Manufacturing of Linear Shaped Charges for Curved Penetration**, JASON HO, CODY LOUGH, PHILLIP MULLIGAN, CATHERINE JOHNSON, Missouri University of Science and Technology —

**1D.00016 Simulating the Propulsive Capability of Explosives Loaded with Inert and Reactive Materials**, QUENTIN PONTALIER, McGill University, JASON LOISEAU, Royal Military College of Canada, AARON LONGBOTTOM, Fluid Gravity Engineering, DAVID FROST, McGill University —

**1D.00017 Quantum-accurate SNAP carbon potential for MD shock simulations**, JONATHAN WILLMAN, ASHLEY WILLIAMS, KIEN NGUYEN CONG, University of South Florida, MITCHELL WOOD, AIDAN THOMPSON, Sandia National Laboratories, IVAN OLEYNIK, University of South Florida —

**1D.00018 Data-Driven Retrosynthetic Predictions for Energetic Materials (symp)**, MICHAEL FORTUNATO, CONNOR COLEY, MIT, BRIAN BARNES, ARL, IGOR SCHWEIGERT, NRL, ARIANA BESTE, ARL, KLAUS JENSEN, MIT —

**1D.00019 First-principles molecular dynamics simulations of high-pressure phase diagram of carbon**, KIEN NGUYEN CONG, JONATHAN WILLMAN, ASHLEY WILLIAMS, University of South Florida, ANATOLY BELONOSHKO, Royal Institute of Technology, IVAN OLEYNIK, University of South Florida —

**Sunday, June 16, 2019 4:00PM - 5:30PM —**

Session 1E Experimental Techniques and Diagnostics Broadway I/II -

**4:00PM 1E.00001 Programmable velocity trap for triggering gun diagnostics<sup>1</sup>**, GARETH TEAR, WILLIAM PROUD, Imperial College London —

<sup>1</sup>The project or effort depicted was or is sponsored by the Department of the Defense, Defense Threat Reduction Agency. The content of the information does not necessarily reflect the position or the policy of the federal government, and no official endorsement should be inferred

**4:15PM 1E.00002 Imaging the Reactive Flow Structure Evolution in Shocked Nitromethane and Nitromethane with Additives**, ERIN NISSEN, MITHUN BHOWMICK, DANA DLOTT, University of Illinois at Urbana-Champaign —

**4:30PM 1E.00003 Probing Shocked Materials with Time-resolved Raman Scattering**, DMITRO MARTYNOWYCH, KEITH NELSON, Massachusetts Institute of Technology —

**4:45PM 1E.00004 Micromechanical approach to model deformation response of granular materials using FEM considering meso-structure from X-ray computed tomography<sup>1</sup>**, MOHMAD MOHSIN THAKUR, DAYAKAR PENUMADU, University of Tennessee, Knoxville —

<sup>1</sup>Defense Threat Reduction Agency(DTRA)

**5:00PM 1E.00005 Using Free Surface Velocity and X-Ray Imaging to Monitor the Closure of a Cylindrical Hole in Copper and Tantalum for Strength Measurements Under Pressure (symp)<sup>1</sup>**, ANDREW ROBINSON, JONATHAN LIND, MATTHEW NELMS, NATHAN BARTON, MUKUL KUMAR, Lawrence Livermore National Laboratory —

<sup>1</sup>This work was performed under the auspices of the US Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

**5:15PM 1E.00006 Feasibility Studies of the Use of Inelastic X-ray Scattering as a Temperature Diagnostic of Transiently Compressed Matter<sup>1</sup>**, OLIVER KARNBACH, DAVID MCGONEGLE, GIANLUCA GREGORI, JUSTIN WARK, University of Oxford —

<sup>1</sup>AWE plc. and Engineering and Physical Research Council

**Monday, June 17, 2019 8:00AM - 9:00AM —**  
Session A1 Plenary Session I Grand Ballroom I/II - Tim Germann, LANL

**8:00AM A1.00001 George E. Duvall Shock Compression Science Award Talk: Developing a Pathway to Microstructure-Aware Predictive Capability for the Dynamic Response of Materials**, GEORGE GRAY, Los Alamos National Laboratory —

**Monday, June 17, 2019 9:15AM - 10:45AM —**  
Session B1 TMS: HE Initiation I Grand Ballroom I - Mitchel Wood, SNL

**9:15AM B1.00001 Systematic study of the explosive chemical kinetics of derivatives of ETN and PETN at low pressure**, MARC CAWKWELL, ROMAIN PERRIOT, VIRGINIA MANNER, Los Alamos National Laboratory —

**9:30AM B1.00002 Nuclear Quantum Effects and their Role in Shock Induced Chemical Initiation of TATB<sup>1</sup>**, BRENDEN W. HAMILTON, Purdue University, MATTHEW P. KROONBLAWD, Lawrence Livermore National Laboratory, MD MAHBUBUL ISLAM, ALEJANDRO STRACHAN, Purdue University —

<sup>1</sup>Prepared by LLNL under Contract DE-AC52-07NA27344 and approved for unlimited release under document number LLNL-ABS-768122.

**9:45AM B1.00003 ReaxFF Predictions on Detonation Properties and Reaction Kinetics across the Energetic Materials<sup>1</sup>**, MD MAHBUBUL ISLAM, BRENDEN HAMILTON, MICHAEL SAKANO, PILSUN YOO, PEILIN LIAO, ALEJANDRO STRACHAN, Purdue University —

<sup>1</sup>This work was supported by the US Office of Naval Research, Multidisciplinary University Research Initiatives (MURI) Program, Contract: N00014-16-1-2557. Program managers: Chad Stoltz and Kenny Lipkowitz

**10:00AM B1.00004 Study of equation of state and equilibrium mixtures** , CHRISTOPHER TICKNOR, STEPHEN ANDREWS, Los Alamos National Laboratory, DARIO PANICI, Nuclear, Plasma, and Radiological Engineering, University of Illinois at Urbana-Champaign, CURTIS PETERSON, Department of Physics and the Department of Mathematical and Statistical Sciences, Arizona State University, VIKTOR TURNER, Department of Physics, The United States Naval Academy, JEFFERY LEIDING, Los Alamos National Laboratory —

**10:15AM B1.00005 ABSTRACT WITHDRAWN** —

**10:30AM B1.00006 Non-Equilibrium Chemical Bonding of Shock-Induced Chemical Reactions.** , ANGUANG HU, Defence Research and Development Canada —

**Monday, June 17, 2019 9:15AM - 10:45AM** —

**Session B2 ERM: Mechanical Testing of Energetic Materials** Grand Ballroom II - Steve Son, Purdue

**9:15AM B2.00001 High-Speed Infrared investigations of local heating in a Graphite-Fiber-PDMS Composite material Under dynamic loading.** , STEPHANE BOUBANGA TOMBET, Telops, 100-2600 Saint-Jean Baptiste Ave, Qubec (QC), Canada, SURAJ RAVINDRAN, ADDIS KIDANE, Mechanical Engineering, University of South Carolina - 300 Main Street A132, Columbia, SC 29208, FRDRICK MARCOTTE, Telops, 100-2600 Saint-Jean Baptiste Ave, Qubec (QC), Canada —

**9:30AM B2.00002 TATB Ratchet Growth and Hydrostatically-Confined PBX 9502** , CAITLIN WOZNICK, DARLA GRAFF THOMPSON, RACCI DELUCA, Los Alamos National Laboratory —

**9:45AM B2.00003 PBX 9501 versus a New Thermomechanical Density Mock: Brazilian Disk Compression Test Comparison** , CHENG LIU, DARLA GRAFF THOMPSON, CAITLIN WOZNICK, JOHN YEAGER, AMANDA DUQUE, RACCI DELUCA, Los Alamos National Laboratory —

**10:00AM B2.00004 Dynamic Shearing Resistance of a Simulant of an Active Material<sup>1</sup>** , PINKESH MALHOTRA, TONG JIAO, RODNEY CLIFTON, PRADEEP GUDURU, Brown University, BROWN UNIVERSITY TEAM —

<sup>1</sup>This project is funded by AFOSR.

**10:15AM B2.00005 The role of heat conduction on hot-spot formation in energetic materials** , ELISEO IGLESIAS, University of Texas at San Antonio, BABAK RAVAJI, JUSTIN WILKERSON, Texas AM University —

**10:30AM B2.00006 Novel PBX formulations containing thermally-expandable microspheres for on-demand control of explosive behavior<sup>1</sup>** , AMANDA DUQUE, BRIAN PATTERSON, LINDSEY KUETTNER, WILLIAM PERRY, JOSEPH MANG, Los Alamos National Laboratory —

<sup>1</sup>All of the work presented here was supported by the U.S. Department of Energy through the LANL/LDRD Program.

**Monday, June 17, 2019 9:15AM - 10:45AM** —

**Session B3 AETD: Ultrafast Methods** Pavilion East - Mike Armstrong, LLNL

**9:15AM B3.00001 Ultrafast Shock Induced Mid-Infrared Vibrational Changes in Thin Film Explosives<sup>1</sup>** , MICHAEL POWELL, Los Alamos National Laboratory, Purdue University, PAMELA BOWLAN, Los Alamos National Laboratory, STEVEN SON, Purdue University, CYNTHIA BOLME, KATHRYN BROWN, DAVID MOORE, MARC CAWKWELL, Los Alamos National Laboratory, ALEJANDRO STRACHAN, Purdue University, SHAWN MCGRANE, Los Alamos National Laboratory —

<sup>1</sup>ONR contract 000062867 Predictive Chemistry & Physics at Extreme Temperature and Pressure: molecules, crystals and microstructure (PCP@Xtreme), and LANL LDRD Office

**9:30AM B3.00002 Pairing Ultrafast Spectroscopy to Nanosecond Shock Generation** , KATHRYN BROWN, Los Alamos National Laboratory, MICHAEL POWELL, Purdue University, Los Alamos National Laboratory, SHAWN MCGRANE, Los Alamos National Laboratory —

**9:45AM B3.00003 Dynamic characterization of energetic materials with Ultrafast Transmission Electron Microscopy<sup>1</sup>** , VOLKAN ORTALAN, University of Connecticut —

<sup>1</sup>This work was supported by the Young Investigator Program of Department of Defense Office of Naval Research (CBET-1437219) and MURI program of Department of Defense of Office of Naval Research (N00014-16-1-2557).

**10:15AM B3.00004 Heat propagation in energetic materials in the first 50 picoseconds** , NHAN DANG, JENNIFER GOTTFRIED, FRANK DELUCIA, US Army Rsch Lab - Aberdeen —

**10:30AM B3.00005 Probing Shocked Materials with Time-resolved Raman Scattering** , DMITRO MARTYNOWYCH, KEITH NELSON, Massachusetts Institute of Technology —

**Monday, June 17, 2019 9:15AM - 10:45AM —**  
**Session B4 MS: Ramp Compression** Pavilion West - Seth Root, SNL

**9:15AM B4.00001 Structural Complexity in Dense Magnesium** , JON EGGERT, MARTIN GORMAN, AMY LAZICKI, LLNL, DAVID MCGONEGLE, Oxford University, STANIMIR BONEV, LLNL, SABRI ELATRESH, Cornell University, JUSTIN WARK, Oxford University, MARC CORMIER, RICHARD BRIGGS, AMY COLEMAN, LLNL, STEVE ROTHMAN, A.W.E, RICHARD KRAUS, DAVID BRAUN, LLNL, GILBERT COLLINS, University of Rochester, PATRICK HEIGHWAY, Oxford University, LISA PEACOCK, A.W.E, FEDERICA COPPARI, LLNL, RYAN RYGG, University of Rochester, MALCOLM MCMAHON, Edinburgh University —

**9:30AM B4.00002 Dynamic Freezing of Liquid Cerium Under Shock-Ramp Compression** , MICHAEL DESJARLAIS, CHRIS SEAGLE, ANDREW PORWITZKY, Sandia National Laboratories, BRIAN JENSEN, Los Alamos National Laboratory —

**9:45AM B4.00003 Measuring the Ramp Equation of State of Lithium Fluoride to 1000 GPa<sup>1</sup>** , SUZANNE ALI, LEO KIRSCH, DAVID BRAUN, DAYNE FRATANDUONO, AMALIA FERNANDEZ-PANELLA, RAYMOND SMITH, MICHELLE MARSHALL, JAMES MCNANEY, JON EGGERT, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

**10:00AM B4.00004 Crystal Structure and Reflectivity of Laser Ramp-Compressed Sodium** , DANAE POLSIN, Laboratory for Laser Energetics, XUCHEN GONG, LINDA CRANDALL, MARGARET HUFF, University of Rochester, THOMAS BOEHLI, Laboratory for Laser Energetics, GILBERT COLLINS, University of Rochester, JON EGGERT, AMY LAZICKI, MARIUS MILLOT, Lawrence Livermore National Laboratory, MALCOLM MCMAHON, University of Edinburgh, JAMES RYGG, University of Rochester —

**10:15AM B4.00005 Analysis of Shocked and Ramp-Compressed Metals to 5 Mbars** , JEFFREY NGUYEN, MINTA AKIN, Lawrence Livermore National Lab, PAUL ASINOW, California Institute of Technology —

**10:30AM B4.00006 Dynamic material properties of tantalum under ramp compression (30-160 GPa)<sup>1</sup>** , GUILIN WANG<sup>2</sup>, ZHAOHUI ZHANG, QIZI SUN, WENJIE YANG, CE JI, WENKANG ZOU, SHUPING FENG, Key Laboratory of Pulsed Power, Institute of Fluid Physics, CAEP, MAGNETICALLY DRIVEN COMPRESSION TEAM<sup>3</sup> —

<sup>1</sup>This work was supported by the National Nature Science Foundation of China (Contract No. 11502254)

<sup>2</sup>Magnetically driven compression and dynamic material properties.

<sup>3</sup>Magnetically driven compression and dynamic material properties on PTS facility of China.

**Monday, June 17, 2019 9:15AM - 10:45AM —**  
**Session B5 BIEP: Fragmentation I** Broadway I/II - Frederick Ouellet, University of Florida

**9:15AM B5.00001 Modeling the Fragmentation of a Brittle Zinc Compact** , CAMERON STEWART, THOMAS MCGRATH, JAMES WARNER, Indian Head Naval Surface Warfare Center —

**9:30AM B5.00002 Characterization of Fracture, Dispersion and Energy Dissipation due to High Velocity Fragment Impacts on Warhead Cases and Armor Materials** , DANIEL PUDLAK, KEVIN MIERS, CCDC-AC —

**9:45AM B5.00003 High Pressure Oblique Shock Interactions in NATO Fragment Impacts** , KEVIN MIERS, NAUSHEEN AL-SHEHAB, DANIEL PUDLAK, US Army CCDC Armaments Center —

**10:00AM B5.00004 Mach stem: large scale experiment to validate analytical model.** , NICOLAS LECYSYN, DIDIER CAPDEVILLE, JEAN-YVES VINCONT, CEA DAM, PIERRE SLANGEN, IMT ALES, ALEXANDRE LEFRANCOIS, YVES GRILLON, ANTOINE OSMONT, CEA DAM, IMT ALES AND CEA GRAMAT COLLABORATION, IMT ALES AND CEA GRAMAT COLLABORATION —

**10:15AM B5.00005 Failure model for boron carbide ceramics improved with using explosive experiments data** , SERGEY DYACHKOV, ANATOLY PARSHIKOV, VASILY ZHAKHOVSKY, SERGEY KURATOV, Dukhov Research Institute of Automatics —



**10:30AM B5.00006 Fragmentation of a liquid tin droplet by a short laser pulse** , SERGEY GRIGORYEV, VASILY ZHAKHOVSKY, SERGEY DYACHKOV, Dukhov Research Institute of Automatics, BOGDAN LAKATOSH, Moscow Institute of Physics and Technology, MIKHAIL KRIVOKORYTOV, VYACHESLAV MEDVEDEV, Institute for Spectroscopy of RAS —

**Monday, June 17, 2019 9:15AM - 10:45AM —**

**Session B6 HED: Silicates and Oxides** Broadway III/IV - Christopher Seagle, SNL

**9:15AM B6.00001 Quantum Hydrodynamics and Warm Dense Matter** , FRANK GRAZIANI, LLNL —

**9:45AM B6.00002 Multiphase equations of state for magnesium oxide, silicon dioxide, and forsterite** , TRAVIS SJOSTROM, Los Alamos National Laboratory —

**10:00AM B6.00003 Equation of State Calculations of Warm Dense MgSiO<sub>3</sub>** , FELIPE GONZALEZ<sup>1</sup>, HENRY PETERSON, Department of Earth and Planetary Science, University of California, Berkeley, California 94720, USA, FRANCOIS SOUBIRAN, Ecole Normale Supérieure de Lyon, Université Lyon 1, Laboratoire de Géologie de Lyon, CNRS UMR5276, Lyon Cedex 07, 69364, France, BURKHARD MILITZER, Department of Earth and Planetary Science, University of California, Berkeley, California 94720, USA —

<sup>1</sup>Also known as Felipe Gonzalez-Cataldo

**10:15AM B6.00004 An Extended X-Ray Absorption Fine Structure Spectroscopy Study of Iron and Iron Oxide** , DAVID ALEXANDER CHIN, PHILIP NILSON, JOHN RUBY, GILBERT COLLINS, Laboratory for Laser Energetics, TOM BOEHLI, Retired, RYAN RYGG, Laboratory for Laser Energetics, DUSTIN TRAIL, University of Rochester, YUAN PING, FEDERICA COPPARI, Lawrence Livermore National Laboratory, MARION HARMAND, Sorbonne Université —

**10:30AM B6.00005 The equation of state of Invar alloy and systematic uncertainties in modeling the re-shock Hugoniot in quartz** , CHAD MCCOY, Sandia National Laboratories —

**Monday, June 17, 2019 11:00AM - 12:30PM —**

**Session C1 TMS: HE Initiation II** Grand Ballroom I - Mark Anderson, SNL

**11:00AM C1.00001 Applying the HERMES Model to Non-shock Ignition and Post-ignition Violence** , JOHN REAUGH, Lawrence Livermore Natl Lab —

**11:30AM C1.00002 Modeling PBX 9501 High Explosive Cylinder Experiments and an Evaluation of WSD and AWS Parameter Sets** , MARVIN ZOCHER, TARIQ ASLAM, MATTHEW PRICE, Los Alamos National Laboratory —

**11:45AM C1.00003 Can we predict how nano-scopic voids affect explosive performance?** , W. LEE PERRY, AMANDA DUQUE, JOHN YEAGER, XIA MA, BRAD CLEMENTS, LARRY HILL, VON WHITLEY, BRIAN PATTERSON, Los Alamos National Laboratory —

**12:00PM C1.00004 Grain-size effects in the shock heating of idealized PBXs** , NISHA MOHAN, Los Alamos National Laboratory —

**12:15PM C1.00005 Computational studies of laser-driven flyer impact experiments to probe properties of inert and energetic materials** , SVJETLANA STEKOVIC, University of Illinois at Urbana-Champaign, H KEO SPRINGER, Lawrence Livermore National Laboratory, MITHUN BHOWMICK, DANA D DLOTT, University of Illinois at Urbana-Champaign —

**Monday, June 17, 2019 11:00AM - 12:30PM —**

**Session C2 ERM: Phase, Melt, and Diffusion** Grand Ballroom II - Amanda Duque, LANL

**11:00AM C2.00001 In Situ Investigation of Phase Transformation in Cyclotrimethylene Trinitramine (RDX) During Shock Loading Using X-ray Diffraction** , KYLE RAMOS, Los Alamos National Laboratory, F.L. ADDESSIO, C.E. ARMENTA, D. BANESH, J.L. BARBER, C.M. BIWER, C.A. BOLME, M.J. CAWKWELL, A.E. GLEASON, A.C. GOLDBERGER, E.L. HARTLINE, D.J. LUSCHER, T.H. PIERCE, R.L. SANDBERG, G.K. WINDLER, LANL, L. DRESSSELHAUS-COOPER, MIT, N. SINCLAIR, P. RIGG, APS-DCS, H.J. LEE, I. NAM, M. SEABERG, LCLS-MEC —

**11:15AM C2.00002 Effect of nonhydrostatic compression on the structural and chemical stability of FOX-7 crystals.**<sup>1</sup> , ZBIGNIEW DREGER, Naval Surface Warfare Center IHEODTD, YOGENDRA GUPTA, Washington State University —

<sup>1</sup>Work supported by DOE/NNSA, ONR and ILIR/NSWC IHEODTD.

**11:30AM C2.00003 Pressure-induced phase transitions in energetic materials revealed by single-crystal diffraction studies**<sup>1</sup> , SAMANTHA CLARKE, BRAD STEELE, MATTHEW KROONBLAWD, JOSEPH ZAUG, I-FENG KUO, SORIN BASTEA, PHILIP PAGORIA, LAURENCE FRIED, ELISSAIOS STAVROU, Lawrence Livermore Natl Lab, JESSE SMITH, Argonne National Laboratory, DONGZHOU ZHANG, University of Chicago, OLIVER TSCHAUNER, University of Nevada, Las Vegas, DYLAN SMITH, BRIAN LITTLE, U. S. Air Force Research Laboratory —

<sup>1</sup>This work was performed under the auspices of the U. S. Department of Energy by Lawrence Livermore National Security, LLC under Contract DE-AC52-07NA27344.

**11:45AM C2.00004 Melt-Curve and Liquid-State Transport Properties of TATB: A Molecular Dynamics Study** , NITHIN MATHEW, Los Alamos National Laboratory, MATTHEW KROONBLAWD, Lawrence Livermore National Laboratory, THOMAS SEWELL, University of Missouri-Columbia, DONALD THOMPSON, University of Missouri-Columbia (Emeritus) —

**12:00PM C2.00005 Search for an elastic-plastic transition in single-crystal TATB using a laser drive**<sup>1</sup> , PAULIUS GRIVICKAS, MATT NELMS, RYAN AUSTIN, BRUCE BAER, JONATHAN CROWHURST, MATTHEW KROONBLAWD, SUZANNE ALI, CAROL DAVIS, THOMAS BUNT, THOMAS MYERS, MICHELLE RHODES, JOE ZAUG, LARA LEININGER, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the U. S. Department of Energy by Lawrence Livermore National Security, LLC under Contract DE-AC52-07NA27344

**12:15PM C2.00006 Diffusion Effects near Discontinuities in Explosions** , DAVID GROTE, ALLEN KUHL, Lawrence Livermore Natl Lab —

**Monday, June 17, 2019 11:00AM - 12:30PM —**

**Session C3 AETD: Optical Imaging of Dynamic Events** Pavilion East - Eric Welle, AFRL

**11:00AM C3.00001 Nanosecond imaging techniques to characterize detonator breakout performance** , MICHAEL MURPHY, CHRISTOPHER TILGER, LARRY HILL, Los Alamos National Laboratory —

**11:15AM C3.00002 Explosive particle image velocimetry in cast polydimethylsiloxane** , CHRISTOPHER TILGER, MICHAEL MURPHY, Los Alamos National Laboratory —

**11:30AM C3.00003 Small scale tests to determine divergence and spreading of explosive booster materials** , ELIZABETH FRANCOIS, PATRICK BOWDEN, BRYCE TAPPAN, LAURA SMILOWITZ, CHRISTINA SCOVEL, MICHAEL BOWDEN, Los Alamos National Laboratory —

**11:45AM C3.00004 Voitenko experiments with novel diagnostics detect velocities of 89 km/s.** , DOUGLAS TASKER, Los Alamos National Laboratory, YOUNG BAE, Y.K. Bae Corp, CARL JOHNSON, KEVIN RAINEY, Los Alamos National Laboratory —

**12:00PM C3.00005 Exploiting New Imaging Techniques to Provide Quantitative Data for Model Validation**<sup>1</sup> , JOSEPH OLLES, Sandia National Laboratories —

<sup>1</sup>Sandia National Laboratories is a multi-mission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, a wholly owned subsidiary of Honeywell International Inc., for the U.S. DOE NNSA under contract DE-NA0003525.

**Monday, June 17, 2019 11:00AM - 12:30PM —**

**Session C4 MS: EOS Development** Pavilion West - Frank Cherne, LANL

**11:00AM C4.00001 Tabulating a Multiphase Equation Of State** , GEOFFREY COX, Atomic Weapons Establishment —

**11:15AM C4.00002 Multiphase EOS development at LLNL – improving EOS fidelity by collective knowledge of experiment and theory: the cases of Beryllium & Gallium<sup>1</sup>**, CHRISTINE WU, CARRIE PRISBREY, JOEL VARLEY, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the US Department of Energy by Lawrence Livermore National Laboratory under Contract No. DE-AC52-07NA27344

**11:30AM C4.00003 Verification of Uncertainty Propagation for Equation of State Tables**, JOHN H. CARPENTER, Sandia National Laboratories\*, ALLEN C. ROBINSON, BERT DEBUSSCHERE, Sandia National Laboratories —

**11:45AM C4.00004 Using experimental uncertainties to build uncertainty aware material models for extreme conditions**, RICHARD KRAUS, Lawrence Livermore Natl Lab, SUZANNE ALI, Lawrence Livermore National Laboratory —

**12:00PM C4.00005 Improved hard sphere radial distribution function in the CRIS equation of state model<sup>1</sup>**, BENJAMIN COWEN, JOHN CARPENTER, Sandia National Laboratories —

<sup>1</sup>Sandia National Laboratories is a multi-mission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International, Inc., for the U.S. DOE's National Nuclear Security Administration under contract DE-NA-0003525.

**12:15PM C4.00006 Automated fitting of a semiempirical multiphase equation of state for carbon**, KIRILL VELIZHANIN, JOSHUA COE, LANL —

**Monday, June 17, 2019 11:00AM - 12:30PM** —  
Session C5 BIEP: Spall I Broadway I/II - David Jones, LANL

**11:00AM C5.00001 Scaling laws for the pressure and rate dependence of spall strength**, JUSTIN WILKERSON, Texas AM University —

**11:15AM C5.00002 Dynamic mechanical properties and fracture response of Dual Phase steels spanning a strain rate range of  $10^2/s$  to  $10^6/s$ .**, SUKANYA M SHARMA, Georgia Institute of Technology, SHRIKANT BHAT, ArcelorMittal Global RD, ARUN GOKHALE, NARESH THADHANI, Georgia Institute of Technology, HIGH STRAIN RATE AND STEREOLOGY TEAM —

**11:30AM C5.00003 Metallurgical Effects on the Spall Response of Metals and Alloys.**, JEREMY MILLETT, AWE plc —

**12:00PM C5.00004 Flyer plate impact tests to investigate the spall fracture of two armor steels**, HONGXU WANG, SIMON HIGGS, ALI AMERI, School of Engineering and Information Technology, The University of New South Wales, MANNY GONZALES, Materials and Manufacturing Directorate, Air Force Research Laboratory, BRODIE MCDONALD, Defence Science and Technology Group, Australia, PAUL HAZELL, ZONGJUN LI, JUAN ESCOBEDO-DIAZ, School of Engineering and Information Technology, The University of New South Wales —

**12:15PM C5.00005 Investigating the effects of plastic deformation on the dynamic tensile strength of Lean Duplex Stainless Steel<sup>1</sup>**, ALI AMERI, MSc(Eng.), J.P. ESCOBEDO-DIAZ, M. GONZALES, H. WANG, Z. QUADIR, P. HAZELL, PhD —

<sup>1</sup>Authors would like to acknowledge the support by the Air Force Office of Scientific Research under grant number FA2386-17-1-4095.

**Monday, June 17, 2019 11:00AM - 12:30PM** —  
Session C6 HED: Shock and Ramp Compression I Broadway III/IV - Justin Brown, SNL

**11:00AM C6.00001 Pseudo-Atom Molecular Dynamics: A model for warm and hot dense matter<sup>1</sup>**, DIDIER SAUMON, Los Alamos National Laboratory —

<sup>1</sup>This work was performed under the auspices of the United States Department of Energy under contract DE-AC52-06NA25396.

**11:30AM C6.00002 Equations of state of ablator materials<sup>1</sup>**, SHUAI ZHANG, Lawrence Livermore Natl Lab, BURKHARD MILTZER, University of California, Berkeley, HEATHER WHITLEY, Lawrence Livermore National Laboratory —

<sup>1</sup>This work was in part performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract No. DE-AC52-07NA27344.

**11:45AM C6.00003 Investigating kinetic properties of warm dense hydrocarbons in shock release experiments.<sup>1</sup>**, JAMES HAWRELIAK, Washington State University, MAX KARASIK, JAECHUL OH, YEFIM AGLITSKIY, Division of Plasma Physics, Naval Research Laboratory —

<sup>1</sup>This work was support by DOE/NNSA and DOE/OFES

**12:00PM C6.00004 Precision Measurements of Stopping Power in Shock-Compressed Carbon**, J. R. RYGG, LLE, University of Rochester, A. B. ZYLSTRA, P. GRABOWSKI, M. MILLOT, LLNL, J. A. FRENJE, M. GATU-JOHNSON, B. LAHMANN, R. D. PETRASSO, F. H. SEGUIN, H. SIO, MIT, Y. H. DING, S. X. HU, LLE, University of Rochester —

**12:15PM C6.00005 Crystal Structure of Ramp-Compressed Silicon up to 550 GPa**, XUCHEN GONG, DANA POLSIN, REETAM PAUL, RAHUL SAHA, RYAN RYGG, GILBERT COLLINS, Laboratory for Laser Energetics —

**Monday, June 17, 2019 2:00PM - 3:00PM —**

**Session D1 DSIC: EOS, Sub-Detonation Response, Multi-shock: Models 1** Grand Ballroom I - Samantha Clarke, LLNL

**2:00PM D1.00001 An Improved Temperature-Dependent Specific Heat Model for Unreacted Explosive Equations of State**, NICHOLAS KERSCHEN, DAVID KITTELL, Sandia National Laboratories —

**2:15PM D1.00002 Unified Form EOS for Detonation Products based on relationship between initial density and detonation velocity**, SHIRO KUBOTA, TEI SABURI, National Institute of Advanced Industrial Science and Technology (AIST), KUNIHITO NAGAYAMA, Kyushu University —

**2:30PM D1.00003 A Generalised Gruneisen Equation of State for Non-Reacted Explosives**, WILLIAM BELFIELD, BRIAN LAMBOURN, Atomic Weapons Establishment —

**2:45PM D1.00004 Rice-Walsh equation of state for detonation product gases**, KUNIHITO NAGAYAMA<sup>1</sup>, Retired, SHIRO KUBOTA, National Institute of Advanced Industrial Science and Technology —

<sup>1</sup>Professor Emeritus Kyushu University

**Monday, June 17, 2019 2:00PM - 3:00PM —**

**Session D2 ERM: Sensitivity, Safety, and Initiation** Grand Ballroom II - Su Peiris

**2:00PM D2.00001 A comparison of Gaussian Process Classification to classical statistical methods in sensitivity tests<sup>1</sup>**, ALEX CASEY, NICK CUMMOCK, ILIAS BILIONIS, STEVEN SON, Purdue University —

<sup>1</sup>This research was conducted with Government support under and awarded by DoD, Air Force Office of Scientific Research, National Defense Science and Engineering Graduate (NDSEG) Fellowship, 32 CFR 168a

**2:15PM D2.00002 TNT Equivalency Testing for Energetic Materials**, KEVIN M. JAANSALU, CHRISTELLE COLLET, ERNEST L. BAKER, MARTIJN M. VAN DER VOORT, Munitions Safety Information Analysis Center (MSIAC), NATO HQ, Brussels, Belgium —

**2:30PM D2.00003 Modeling the Response of Steven Tests**, ELISHA REJOVITZKY, RAFAEL, YEHUDA PARTOM, Retired, ROMAN KOSITSKI, ALON MALKA-MARKOVITZ, RAFAEL —

**2:45PM D2.00004 Modeling of TATB-Based HE Cook-off for Safety Analysis<sup>1</sup>**, JASON MOORE, MATTHEW MCCLELLAND, PETER HSU, EVAN KAHL, Lawrence Livermore Natl Lab —

<sup>1</sup>This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

## Monday, June 17, 2019 2:00PM - 3:00PM –

Session D3 AETD: Detonation Diagnostics 1 Pavilion East - Arnaud Sollier, CEA

**2:00PM D3.00001 Pulsed Laser Imaging For Explosive Event** , KEVIN MCNESBY, US Army Research Laboratory —

**2:30PM D3.00002 Quantitative High Speed Imaging for a Sympathetic Detonation Study** , DANA DUKE, AMY BAUER, JEREMY DANIELSON, ROBERT GONZALES, DAVID OSCHWALD, Los Alamos National Laboratory —

**2:45PM D3.00003 Developments and analysis of pulse correlation reflectometry for the characterisation of shock and detonation waves** , CALLUM PRYER, Atomic Weapons Establishment —

## Monday, June 17, 2019 2:00PM - 3:00PM –

Session D4 MS: Water Pavilion West - Yingwei Fei, Carnegie Institution for Science

**2:00PM D4.00001 Probing the Metastability Limit of Liquid Water under Dynamic Compression<sup>1</sup>** , MICHELLE MARSHALL, MARIUS MILLOT, DAYNE FRATANDUONO, PHILIP MYINT, JON BELOF, RAY SMITH, JAMES MCNANEY, Lawrence Livermore Natl Lab —

<sup>1</sup>Prepared by LLNL under Contract DE-AC52-07NA27344

**2:15PM D4.00002 Using THOR to manipulate the homogeneous phase transition and nucleation rates in freezing water** , ERIN NISSEN, University of Illinois at Urbana-Champaign, DANIEL DOLAN, Sandia National Laboratories —

**2:30PM D4.00003 Study of shock growth of ice VI single crystal near equilibrium melting pressure with dynamic diamond anvil cell** , YONG-JAE KIM, Lawrence Livermore Natl Lab, Korea Research Institute of Standards and Science, YUN-HEE LEE, SOOHEYONG LEE, Korea Research Institute of Standards and Science, HIROKI NADA, National Institute of Advanced Industrial Science and Technology, GEUN WOO LEE, Korea Research Institute of Standards and Science —

**2:45PM D4.00004 Comparing different water equations of state for aquarium tests** , EDUARDO LOZANO, Colorado School of Mines, TARIQ ASLAM, Los Alamos National Laboratory, VILEM PETR, GREGORY S. JACKSON, Colorado School of Mines, LOS ALAMOS NATIONAL LABORATORY TEAM, COLORADO SCHOOL OF MINES TEAM —

## Monday, June 17, 2019 2:00PM - 3:00PM –

Session D5 BIEP: Ejecta I Broadway I/II - Robin Williams, AWE

**2:00PM D5.00001 High Speed Imaging of Sheet Breakup Dynamics via Wide Angle Optical Scattering<sup>1</sup>** , JOHNNY GOETT, JOHN CHARONKO, WILLIAM BUTTLER, Los Alamos National Laboratory, MICHAEL GROVER, BRANDON LA LONE, JASON MANCE, MSTs Special Technologies Laboratory, RUBEN MANZANARES, JOHN MARTINEZ, DEREK SCHMIDT, Los Alamos National Laboratory, GERALD STEVENS, WILLIAM TURLEY, MSTs Special Technologies Laboratory —

<sup>1</sup>This research is funded by the Los Alamos National Laboratory LDRD Directed Research

**2:15PM D5.00002 Improvements to Asay Foils for Enhanced Dynamic Range and Robustness<sup>1</sup>** , PAUL STEELE, STEVE COMPTON, LOUIS FERRANTI, JOSE SINIBALDI, Lawrence Livermore National Laboratory —

<sup>1</sup>This work was performed under auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

**2:30PM D5.00003 Asay Foil – Ejecta Interactions<sup>1</sup>** , JOSE SINIBALDI, PAUL STEELE, KERRY KRAUTER, OWEN MAYS, STEVE COMPTON, LOU FERRANTI, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

**2:45PM D5.00004 Hydrodynamics simulations of a low-cost, high-throughput, and compact high-explosive ejecta source platform<sup>1</sup>** , LEO KIRSCH, FADY NAJJAR, JOSE SINIBALDI, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract DE-AC52-07NA27344. Lawrence Livermore National Security, LLC. LLNL-ABS-767477

## Monday, June 17, 2019 2:00PM - 3:30PM –

Session D6 HED: Shock and Ramp Compression II Broadway III/IV - Jack Wise, SNL

**2:00PM D6.00001 Shock Compression Response of Calcium Fluoride (CaF<sub>2</sub>)<sup>1</sup>**, SETH ROOT, MICHAEL DESJARLAIS, PATRICIA KALITA, CHAD MCCOY, SCOTT ALEXANDER, Sandia National Laboratories —

<sup>1</sup>SNL is managed and operated by NTESS under DOE NNSA contract DE-NA0003525

**2:15PM D6.00002 Absolute measurement of the compression of deuterium along isentropes to multi-TPa pressures<sup>1</sup>**, P. M. CELLIERS, A. FERNANDEZ-PAELLA, Lawrence Livermore Natl Lab, S. BRYGOO, CEA/DAM Bruyeres-le-Chatel, France, D. SWIFT, S. J. ALI, S. W. HAAN, M. MILLOT, J. H. EGGERT, D. E. FRATANDUONO, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by LLNL under contract DE-AC52-07NA27344.

**2:30PM D6.00003 Multiple shock reverberation compression of dense Ne up to the warm dense regime: Evaluating the theoretical models**, QI-FENG CHEN, National Key Laboratory of Shock Wave and Detonation Physics, Institute of Fluid Physics, CAEP, JUN TANG, Institute of Fluid Physics, CAEP, YUN-JUN GU, JUN ZHENG, CHENG-JUN LI, YU-FENG WANG, ZHI-GUO LI, National Key Laboratory of Shock Wave and Detonation Physics, Institute of Fluid Physics, CAEP —

**2:45PM D6.00004 Computational and Experimental Hugoniot of Ti64 to 600 GPa<sup>1</sup>**, KYLE COCHRANE, PATRICIA KALITA, SETH ROOT, TOMMY AO, Sandia National Laboratories —

<sup>1</sup>Sandia National Labs is managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a subsidiary of Honeywell International, Inc., for the U.S Dept. of Energys National Nuclear Security Administration under contract DE-NA0003525.

**3:00PM D6.00005 Improved analysis of converging shock experiments for absolute equation of state and opacity<sup>1</sup>**, DAMIAN SWIFT, AMY LAZICKI, ANDREA KRITCHER, MADISON MARTIN, NATALIE KOSTINSKI, BRIAN MADDOX, TILO DOEPPNER, HEATHER WHITLEY, ALISON SAUNDERS, JOSEPH NILSEN, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

**3:15PM D6.00006 Atomic and Electronic Structure of Warm Dense Silicon**, RAHUL SAHA, Laboratory for Laser Energetics, University of Rochester, JACOB TOPP-MUGGLESTONE, GIANLUCA GREGORI, University of Oxford, THOMAS BOEHLY, GILBERT COLLINS, SEAN REGAN, Laboratory for Laser Energetics, University of Rochester, THOMAS WHITE, University of Nevada, RYAN RYGG, Laboratory for Laser Energetics, University of Rochester —

## Monday, June 17, 2019 3:30PM - 5:00PM –

Session E1 DSIC: Detonators Grand Ballroom I - Elizabeth Lee, AWE

**3:30PM E1.00001 Capacitive Sensing of a Detonation Wave's Reaction Zone**, JAMES EDGELEY, CHRIS BRAITHWAITE, University of Cambridge —

**3:45PM E1.00002 The Effect of Surface Area and Density on the Volumetric Shock Initiation of PETN**, ROSEMARY BURRITT, MICAEL BOWDEN, Los Alamos National Laboratory —

**4:00PM E1.00003 Effect of metallic foil thickness distribution on energy deposition during its electrical exploding**, FAN LEI, QIUBO FU, None —

**4:15PM E1.00004 Initiation Studies on Exploding Bridgewires and Spark Gaps**, NATHANIEL SANCHEZ, Los Alamos National Laboratory, WILL NEAL, Atomic Weapons Establishment, DOUG MCHUGH, BRIAN JENSEN, Los Alamos National Laboratory, LOS ALAMOS NATIONAL LABORATORY COLLABORATION, ATOMIC WEAPONS ESTABLISHMENT COLLABORATION —

**4:30PM E1.00005 Shock Waves Formed by the Geometric Characteristics of Exploding Metal Wires**, WILLIAM NEAL, Atomic Weapons Establishment, NATE SANCHEZ, Los Alamos National Laboratory

**4:45PM E1.00006 High-Throughput Initiation: Flyer and Thin-Film Explosive Characterization<sup>1</sup>** , ALEXANDER TAPPAN, ROBERT KNEPPER, Sandia National Laboratories, SAMUEL D. PARK, Naval Research Laboratory, RANDAL SCHMITT, STEPHEN RUPPER, JOHNATHAN VASILIAUSKAS, CAITLIN H. O'GRADY, SHAWN C. STACY, MICHAEL P. MARQUEZ, Sandia National Laboratories —

<sup>1</sup>This work was supported in part by the Joint Department of Defense/Department of Energy Munitions Technology Development Program as well as Sandias Laboratory Directed Research and Development program. Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energys National Nuclear Security Administration under contract DE-NA0003525.

**Monday, June 17, 2019 3:30PM - 5:00PM —**

**Session E2 ERM: Thermal response, cook-off, and aging** Grand Ballroom II - Mark Mason, NAWSWD

**3:30PM E2.00001 Prediction of Thermal Decomposition Temperatures Using Statistical Methods** , ARIANA BESTE, BRIAN BARNES, US Army Research Laboratory —

**3:45PM E2.00002 Measurements of shock sensitivity in a damaged explosive using a small-scale gap test<sup>1</sup>** , NICK CUMMOCK, ALEX CASEY, GABRIEL MONTOYA, Purdue University, CHRIS MOLEK, CHAD RUMCHIK, AFRL, STEVEN SON, Purdue University —

<sup>1</sup>Author N.R.C. wishes to acknowledge support from the Science, Mathematics and Research for Transformation (SMART) Scholarship for Service Program under grant No. 2016-99534.

**4:00PM E2.00003 Characterization of Solid Residue Formation in LX-17 Abnormal Thermal Environments** , JOHN REYNOLDS, EVAN KAHL, NICK MUETTERTIES, A. J. NELSON, HARRIS MASON, JONATHAN CROWHURST, LLNL, EMC TEAM —

**4:15PM E2.00004 Understanding the hygrothermal aging effects and lifetime prediction on a NASA standard initiator** , JU YOUNG OH, JACK YOH, Seoul National University —

**4:30PM E2.00005 Synthesizing nitrogen-rich compounds and investigating their as ingredients of novel composite propellants** , MATEUSZ SZALA, Department of Explosives, Military University of Technology —

**Monday, June 17, 2019 3:30PM - 5:00PM —**

**Session E3 AETD: Detonation Diagnostics II** Pavilion East - Philip Rae, LANL

**3:30PM E3.00001 Measurement and Characterization of a Two-Shock Explosive Drive.** , JEREMY DANIELSON, AMY BAUER, Los Alamos National Laboratory —

**3:45PM E3.00002 Dynamic three-dimensional observation of corner turning in LX-17 with flash x-rays** , JOSEPH TRINGE, Lawrence Livermore Natl Lab, MICHAEL ZELLNER, US Army Research Laboratory, CLIFTON MORTENSEN, FRANCO GAGLIARDI, JEREL SMITH, KYLE CHAMPLEY, Lawrence Livermore Natl Lab —

**4:00PM E3.00003 Improved coupling structures for microwave interferometry of detonation fronts.** , OWEN MAYS, EMER BALUYOT, MARK CONVERSE, LISA LAUDERBACH, RONALD KANE, CLARK SOUERS, JOSEPH TRINGE, Lawrence Livermore Natl Lab —

**4:15PM E3.00004 Detonation Electric Effect Measurements in PBX 9501 and Comparison with Hydrocode Calculations** , CARL JOHNSON, KENDRA VAN BUREN, HENRY ANAYA, LORI LYNCH, JUAN-ANTONIO VIGIL, ERNEST SALAZAR, Los Alamos National Laboratory, FRANCOIS HEMEZ, Lawrence Livermore National Laboratory —

**4:30PM E3.00005 Development of a Near Field Air Blast Measurement Device** , NICHOLAS FALCONE, NICHOLAS OWENS, VASANT JOSHI, NSWC IHEODTD —

**4:45PM E3.00006 High Temperature Experiments By Using Porous Mixtures at the Dynamic Compression Sector at the Advanced Photon Source** , GERRIT SUTHERLAND, TIMOTHY JENKINS, NICHOLAS LORENZO, ERIC JOHNSON, US Army Rsch Lab - Aberdeen Proving Ground —

**Monday, June 17, 2019 3:30PM - 5:00PM —**

**Session E4 MS: Strength & Spall I** Pavilion West - Naresh Thandhani, Georgia Tech

**3:30PM E4.00001 The Response of High-Purity Titanium to Sweeping Detonation Waves** , LAWRENCE HULL, GEORGE GRAY, PHILLIP MILLER, THOMAS NIZOLEK, Los Alamos National Laboratory —

**3:45PM E4.00002 The role of microstructure on elastic precursor decay** , JOHN JONSSON, DAVID CHAPMAN, DANIEL EAKINS, Department of Engineering Science, University of Oxford —

**4:00PM E4.00003 Towards Predicting a Microstructure's Susceptibility to Spall** , SARYU FENSIN, Los Alamos National Laboratory —

**4:30PM E4.00004 The effect of peak stress (3.0 GPa to 20.0 GPa) on the spallation of lean duplex stainless steel<sup>1</sup>** , JUAN PABLO ESCOBEDO, ALI AMERI, School of Engineering and IT, UNSW Canberra, Australia, MANNY GONZALES, Materials and Manufacturing Directorate, Air Force Research Laboratory, Wright-Patterson AFB, OH 45433, USA, HONGXU WANG, RAYMOND MILLER, PAUL HAZELL, School of Engineering and IT, UNSW Canberra, Australia, ZAKARIA QUADIR, Microscopy and Microanalysis Facility (MMF), Curtin University, Perth, Australia —

<sup>1</sup>Work supported by the Air Force Office of Scientific Research under grant number FA2386-17-1-4095.

**4:45PM E4.00005 Shock recompression of spall damage** , DAVID JONES, SARYU FENSIN, Los Alamos National Laboratory, ROBERT HIXSON, Mission Support and Test Services —

**Monday, June 17, 2019 3:30PM - 5:00PM —**  
Session E5 BIEP: Ejecta II Broadway I/II - Billy Buttler, LANL

**3:30PM E5.00001 Material ejection from surface defects in laser shock-loaded metallic foils.** , THIBAUT DE RESSEGUIER<sup>1</sup>, Institut Pprime, ENSMA, CNRS, Univ. Poitiers, France —

<sup>1</sup>Contributors to this work are Gabriel Prudhomme, Caroline Roland, Emilien Lescoute, Arnaud Sollier, Didier Loison, and Erik Brambrink

**4:00PM E5.00002 Development of high-power laser platforms to study metal ejecta interactions<sup>1</sup>** , ALISON SAUNDERS, SUZANNE ALI, JON EGGERT, TOMORR HAXHIMALI, CHANNING HUNTINGTON, LEO KIRSCH, BRANDON MORGAN, FADY NAJJAR, HYE-SOOK PARK, Lawrence Livermore Natl Lab, HANS RINDERKNECHT, Laboratory for Laser Energetics —

<sup>1</sup>LLNL-ABS-767752. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344 and supported by Laboratory Directed Research and Development (LDRD) Grant No. 18-ERD-060.

**4:15PM E5.00003 Development of a high resolution ps laser imaging diagnostic for microjetting characterization** , ARNAUD SOLLIER, EMILIE LESCOUTE, CEA, DAM, DIF, F-91297 Arpajon, France —

**4:30PM E5.00004 Hydrodynamic studies in support of high-power laser experiments to study metal ejecta interactions<sup>1</sup>** , TOMORR HAXHIMALI, FADY NAJJAR, Lawrence Livermore Natl Lab, PETROS TZEFERACOS, University of Chicago, ALISON SAUNDERS, Lawrence Livermore Natl Lab, N/A TEAM, MERIT EJECTA TEAM —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract DE-AC52-07NA27344. Lawrence Livermore National Security, LLC.

**4:45PM E5.00005 Electrically stimulated high speed microjet for medical applications** , HWI-CHAN HAM, JACK YOH, Seoul National University —

**Monday, June 17, 2019 3:30PM - 5:00PM —**  
Session E6 TMS: First-principles and Molecular Dynamics I Broadway III/IV - Aidan Thompson, SNL

**3:30PM E6.00001 Non-Schmid effect of pressure on plastic deformation in molecular crystal HMX.** , ANIRBAN PAL, CATALIN PICU, Rensselaer Polytechnic Institute —

**3:45PM E6.00002 Anisotropic Thermomechanical Response to Shock Wave Loading in TATB** , PUHAN ZHAO, University of Missouri, MATTHEW KROONBLAWD, Lawrence Livermore National Laboratory, NITHIN MATHEW, Los Alamos National Laboratory, TOMMY SEWELL, University of Missouri —



**4:00PM E6.00003 Pressure, temperature, and orientation dependence of the thermal conductivity of  $\alpha$ - and  $\gamma$ -RDX**, ROMAIN PERRIOT, MARC CAWKWELL, JOHN LAZARZ, SHAWN MCGRANE, KYLE RAMOS, Los Alamos National Laboratory —

**4:15PM E6.00004 Theoretical study of interfacial thermal conductance for  $\beta$ -HMX/PVDF interface<sup>1</sup>**, HANG FAN, School of Mechatronical Engineering, Beijing Institute of Technology, Beijing 100081, P. R. China, FUDE NIE, Institute of Chemical Materials, China Academy of Engineering Physics, Mianyang 621900, P. R. China, PENGWAN CHEN, School of Mechatronical Engineering, Beijing Institute of Technology, Beijing 100081, P. R. China —

<sup>1</sup>This work was supported by NSAF (Grant No. U1530262 and No. U1330202 ) and President Foundation of CAEP (Grant No. YZJLX2016005)

**4:30PM E6.00005 A mesoscopic model with non-linear elasticity and phase transformation framework for the twinning-buckling behavior of TATB under dynamic loading: A Molecular Dynamics inferred constitutive law**, PAUL LAFOURCADE, CEA DAM DIF —

**Monday, June 17, 2019 5:30PM –**  
Session F1 Poster Session | Atrium Ballroom -

**F1.00001 Rice-Walsh equation of state for unreacted high explosives based on isothermal compression data**, KUNIHITO NAGAYAMA<sup>1</sup>, Retired, SHIRO KUBOTA, National Institute of Advanced Industrial Science and Technology —

<sup>1</sup>Professor Emeritus Kyushu University

**F1.00002 Overview of the First SHPB Experiments on Single Crystal Explosives**, CHRISTOPHER MEREDITH, DANIEL CASEM, US Army Rsch Lab - Aberdeen, CHENG LIU, BENJAMIN MORROW, CARL CADY, KYLE RAMOS, Los Alamos National Lab —

**F1.00003 Introducing HEDONIST- A Low Explosive Mass Experiment That Attains Very High Pressures**, CARL JOHNSON, ANTHONY FREDENBURG, SCOTT RAMSEY, BRYCE GEESEY, ERNESTO MARTINEZ, ANNA LLOBET, Los Alamos National Laboratory —

**F1.00004 Structure-property response of gold films with controlled microstructure**, DANIEL HOOKS, WILLIAM ANDERSON, ANIRBAN MANDAL, GEORGE GRAY, BRIAN JENSEN, Los Alamos National Laboratory —

**F1.00005 The response of common shock initiation diagnostics subjected to complex shock profiles**, SIMON FINNEGAN, GARETH APPLEBY-THOMAS, Cranfield University, JAMES FERGUSON, AWE —

**F1.00006 The Cause of Lost Time in an Exploding Bridgewire Detonator**, ELIZABETH LEE, ROD DRAKE, Atomic Weapons Establishment —

**F1.00007 Effects of parametric uncertainty on multi-scale model predictions of shock response of a pressed energetic material**, SANGYUP LEE, OISHIK SEN, NIRMAL KUMAR RAI, NICK GAUL, K.K. CHOI, HS UDAYKUMAR, University of Iowa —

**F1.00008 Investigation of non-critical pore size effects on detonation front shapes for conventional and 3D printed explosives**, GABRIEL MONTOYA, NICK CUMMOCK, MONIQUE MCCLAIN, DIANE COLLARD, STEVEN SON, Purdue University, TERRY SALYER, Los Alamos National Laboratory —

**F1.00009 The Deflagration-to-Detonation Transition (DDT) in High Density Pentaerythritol Tetranitrate (PETN)**, PETER SCHULZE, IAN LOPEZ-PULLIAM, ERIC HEATWOLE, TREVOR FEAGIN, GARY PARKER, Los Alamos National Laboratory, M-6 EXPLOSIVES APPLICATIONS AND SPECIAL PROJECTS TEAM —

**F1.00010 Modeling Material Diffusion in Combustion Processes Using Smoothed Dissipative Particle Dynamics**, NIKOLAI PETSEV, XIA MA, BRYAN HENSON, BRAD CLEMENTS, Los Alamos National Laboratory —

**F1.00011 The Design and Testing of an Impact Ignited Deflagration-to-Detonation Experiment**, IAN LOPEZ-PULLIAM, PETER SCHULZE, ERIC HEATWOLE, TREVOR FEAGIN, GARY PARKER, Los Alamos National Laboratory —

**F1.00012 Optimal Parameterization of DSD Programmed Burn Models in ALE3D with DAKOTA** , KEVIN MIERS, ADAM ENEA, BRIAN TRAVERS, US Army CCDC Armaments Center —

**F1.00013 Jones-Wilkins-Lee Product Equations of State for Overdriven PETN Detonation** , CRAIG TARVER, Lawrence Livermore Natl Lab —

**F1.00014 Enhanced Blast from Partial Reaction of a Solid Propellant** , YEHUDA PARTOM, Retired —

**F1.00015 Exploring the Connections between Acoustic Nonlinearity and Performance Characteristics in Aged PETN Pellets<sup>1</sup>** , EMILY PITTMAN, PETER SCHULZE, Los Alamos National Laboratory, M-6, CARLY DONAHUE, Los Alamos National Laboratory, EES-17, JOSEPH MANG, Los Alamos National Laboratory, M-7, CHRISTOPHER ARMSTRONG, Los Alamos National Laboratory, M-6, TJ ULRICH, Los Alamos National Laboratory, Q-6, DAVID MOORE, Los Alamos National Laboratory, M-9, JAMES TEN CATE, Los Alamos National Laboratory, EES-17, LOS ALAMOS NATIONAL LABORATORY TEAM —

<sup>1</sup>Research presented in this presentation was supported in part by the Laboratory Directed Research and Development program of Los Alamos National Laboratory under project number 20180578ER.

**F1.00016 Mesoscale modeling of TATB-HMX explosive mixtures** , H. KEO SPRINGER, SORIN BASTEVA, LARRY FRIED, CRAIG TARVER, BRADLEY WHITE, Lawrence Livermore National Laboratory —

**F1.00017 Fragmentation of Brittle Reactive Materials<sup>1</sup>** , JAKE KLINE, JOE HOOPER, Naval Postgraduate School —

<sup>1</sup>Funding Provided by the Office of Naval Research

**F1.00018 A framework for propagation of uncertainties from meso- to continuum scale computational models for shock-to-detonation transition in energetic materials.** , OISHIK SEN, SIDHARTHA ROY, SANGYUP LEE, NIRMAL RAI, MIN-YEONG MOON, K.K. CHOI, H.S. UDAYKUMAR, University of Iowa —

**F1.00019 Detonation Performance and Shock Sensitivity Analysis of Energetic Cocrystals<sup>1</sup>** , VASANT VUPPULURI, GABRIEL A. MONTOYA, NICHOLAS CUMMOCK, STEVEN F. SON, Purdue University —

<sup>1</sup>Army Research Office W911NF-13-1-0387

**F1.00020 The Role of Adhesion and Young's Modulus in Hot-Spot Formation in Energetic Materials Due to Ultrasonic and Impact Excitation<sup>1</sup>** , JASON WICKHAM, ZANE ROBERTS, STEPHEN BEAUDOIN, STEVEN SON, Purdue University —

<sup>1</sup>Air Force Office of Scientific Research

**F1.00021 Engineered Defects in Single Crystal HMX<sup>1</sup>** , CHRISTIAN SORENSEN, CAMILO DUARTE, STEVEN SON, Purdue University —

<sup>1</sup>ONR Funded PCP@Xtreme MURI

**F1.00022 Predicting localisation of aluminum particles during the post-detonation phase of high metalized explosives** , SUAREZ JIMMY, DAM, CEA, Gramat; IMFT, 31400 France, COURTIAUD SBASTIEN, BAUDIN GRARD, DAM, CEA, Gramat, France, POINSOT THIERRY, SELLE LAURENT, IMFT; CNRS; 31400 Toulouse, France, IMFT - MILIEUX REACTIFS TEAM, DAM CEA - CENTRE DE GRAMAT TEAM —

**F1.00023 Simulating the Propulsive Capability of Explosives Loaded with Inert and Reactive Materials** , QUENTIN PONTALIER, McGill University, JASON LOISEAU, Royal Military College of Canada, AARON LONGBOTTOM, Fluid Gravity Engineering Ltd., DAVID L. FROST, McGill University —

**F1.00024 Flash ignition of nanoaluminum and fluoropolymer composites.** , KYLE UHLENHAKE, METIN ORNEK, STEVEN SON, Purdue University —

**F1.00025 Role of Heterogeneities on the Shock Compression Response of Mock-Additively Manufactured Energetic Materials (AMEMs)<sup>1</sup>** , ANDREW BODDORFF, GREG KENNEDY, HANNAH WOODS, Georgia Institute of Technology, DIDIER MONTAIGNE, Eglin AFRL, BLAIR BRETTMANN, NARESH THADHANI, Georgia Institute of Technology —

<sup>1</sup>This project is supported by DTRA grant HDTRA-18-1-004.

**F1.00026 Additive Manufacturing of Linear Shaped Charges for Curved Penetration** , JASON HO, CODY LOUGH, PHILLIP MULLIGAN, CATHERINE JOHNSON, Missouri University of Science and Technology —

**F1.00027 Effects of Inert Additives on Cyclotrimethylene-Trinitramine (RDX)/Trinitrotoluene (TNT) Detonation Parameters to Predict Detonation Synthesis Phase Production<sup>1</sup>** , MARTIN LANGENDERFER, CATHERINE JOHNSON, WILLIAM FAHRENHOLTZ, Missouri University of Science and Technology —

<sup>1</sup>Army Research Office BAA W911NF-17-S-0002

**F1.00028 Front surface impact experiments using multiple windows for unreacted Hugoniot measurements of high explosives formulations** , ADAM PACHECO, CINDY BOLME, ADAM GOLDBERGER, CLAUDINE ARMENTA, RAMON SAAVEDRA, JOHN LAZARZ, ERNEST HARTLINE, GARY WINDLER, KYLE RAMOS, Los Alamos National Laboratory, HE CRYSTAL LAB TEAM —

**F1.00029 Modeling of what may happen after a Thermal Explosion** , YEHUDA PARTOM, Retired —

**F1.00030 Modeling Ratchet Growth as Porosity Creep** , YEHUDA PARTOM, Retired —

**F1.00031 Thermal Stability of Solid and Molten Erythritol Tetranitrate (ETN)** , DANIEL MCDONALD, NICHOLAS LEASE, GEOFFREY BROWN, BRYCE TAPPAN, VIRGINIA MANNER, Los Alamos National Laboratory —

**F1.00032 Double Shock in Polystyrene** , ZAIRE K. SPROWAL, THOMAS BOEHLY BOEHLY, DANAE POLSIN, University of Rochester, DAMIEN HICKS, Swinburne Institute of Technology, J. RYAN RYGG, GILBERT COLLINS, MARGARET HUFF, University of Rochester —

**F1.00033 Impactful Times: Memories of 60 Years of Shock Wave Research at Sandia National Laboratories<sup>1</sup>** , MARY ANN SWEENEY, Sandia National Laboratories, JAMES R. ASAY, LALIT C. CHHABILDAS, R. JEFFERY LAWRENCE, Sandia National Laboratories, retired —

<sup>1</sup>Sandia National Laboratories is a multi-mission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

**F1.00034 Shock-Compressed Methane to 400 GPa** , G. TABAK, T. R. BOEHLY, G. W. COLLINS, L. CRANDALL, B. J. HENDERSON, J. R. RYGG, M. ZAGHOO, Laboratory for Laser Energetics, University of Rochester, USA, M. MILLOT, S. ALI, P. M. CELLIERS, J. H. EGGERT, D. E. FRATANDUONO, S. HAMEL, A. LAZICKI, D. C. SWIFT, Lawrence Livermore National Laboratory, USA, S. BRYGOO, P. LOUBEYRE, CEA, France, R. KODAMA, K. MIYANISHI, T. OGAWA, N. OZAKI, T. SANO, Osaka University, Japan, R. JEANLOZ, University of California, Berkeley, USA, D. G. HICKS, Swinburne University of Technology, Australia —

**F1.00035 Examination of Shaped Charge Performance with ECAP Produced Liners** , ROY CEDER, VITALY LEUS, YURI KHOPTIAR, Rafael Advanced Defense Systems —

**F1.00036 Ejecta from Liquid Gallium During Planar Impact Experiments** , JASON LOISEAU, Royal Military College of Canada, JUSTIN HUNECAULT, WILLIAM GEORGES, ANDREW J. HIGGINS, McGill University —

**F1.00037 Microstructure-based hypervelocity impact simulations of additively manufactured composite shielding** , MANNY GONZALES, Materials and Manufacturing Directorate, Air Force Research Laboratory, WPAFB, Ohio 45433, LAUREN POOLE, MATTHEW FRENCH, WILLIAM YARBERRY, ZACHARY CORDERO, Materials Science and NanoEngineering, Rice University, Houston, TX 77005 —

**F1.00038 Effects of metal/air barriers on sympathetic detonation mitigation** , SHAWN STRICKLAND, ROBERT REEVES, CLIFTON MORTENSON, DENNIS BAUM, BOB NAFZINGER, KEVIN HOOD, Lawrence Livermore Natl Lab —

**F1.00039 Microstructure Effects on the Spall Response and Failure Mechanisms of Additively Manufactured Stainless Steel 316L (SS316L)** , KATIE KOUBE, Georgia Institute of Technology, KAILA BERTSCH, University of Wisconsin - Madison, GREG KENNEDY, Georgia Institute of Technology, DAN THOMA, University of Wisconsin - Madison, JOSH KACHER, NARESH THADHANI, Georgia Institute of Technology —

**F1.00040 Commissioning of a Fiber-Coupled Equation-of-State Diagnostics Package in the UC Davis Shock Compression Lab** , MERAL BASIT, DYLAN SPAULDING, ERIK DAVIES, SARAH STEWART, Department of Earth and Planetary Science, University of California, Davis —

**F1.00041 Experimental Beamline Endstation Concepts for a Dynamic Mesoscale Materials Science Capability** , JEN BOHON, ADRIANNA ORTEGA, CRIS W. BARNES, RICHARD L. SHEFFIELD, JOSEPH A. O'TOOLE, Los Alamos National Laboratory —

**F1.00042 Designing a novel perforated diamond anvil for laser-driven shock wave experiments with pre-compressed samples** , N. NISSIM, G. OREN, L. PERELMUTTER, M. WERDIGER, S. ELIEZER, N. SAPIR, Soreq NRC, Yavne, Isreal, M. GORMAN, S. ALI, R. SMITH, LLNL, Livermore, CA, USA, R. JEANLOZ, UC Berkeley, Berkeley, CA, USA —

**F1.00043 Recent BLR development at CEA** , AURLIE AZZOLINA, PATRICK MERCIER, ESTELLE DUBREUIL, CEA-DAM-DIF, 91297, Arpajon, France, CEA-DIF-DAM TEAM —

**F1.00044 Conceptual studies of a high-energy X-ray detector system for MaRIE/DMMSC** , YANCEY SECHREST, JOHN L. BARBER, CHRIS W. BARNES, JEN BOHON, Los Alamos National Laboratory, CHEN HU, California Institute of Technology, XUAN LI, Los Alamos National Laboratory, QUINN LOOKER, J. L. PORTER, Sandia National Laboratories, LIYUAN ZHANG, RENYUAN ZHU, California Institute of Technology, ZHEHUI WANG, Los Alamos National Laboratory —

**F1.00045 Developing high performance preheating devices for ramp compression experiments on high pulsed powers drivers** , THIERRY D'ALMEIDA, JRMY VICH, GAEL LE BLANC, CAMILLE CHAUVIN, Commissariat a l'Energie atomique et aux energies alternatives, THIERRY DUVAUT, Universit de Reims Champagne Ardenne —

**F1.00046 Modernization of Los Alamos Impact Facilities: From Ancho Canyon to the new Dynamic Equation-of-State Facility (DEOS** , JOHN WRIGHT, JOSEPH RIVERA, SANTIAGO MARTINEZ, WILLIAM ANDERSON, BRAIAN JENSEN, Los Alamos National Laboratory —

**F1.00047 Temperature control in shock physics experiments** , SANTIAGO MARTINEZ, Los Alamos National Laboratory —

**F1.00048 Construction and Calibration of a Streaked Optical Spectrometer for Shock Temperature** , DYLAN SPAULDING, ERIK DAVIES, SARAH STEWART, University of California, Davis —

**F1.00049 High Speed Microscopic Imaging of Initiation and Propagation of Adiabatic Shear Bands** , PINKESH MALHOTRA, PRADEEP GUDURU, Brown University, BROWN UNIVERSITY TEAM —

**F1.00050 Technology Advancements in Digitizers: More than 8-bits, ultra-low noise and high ENOB** , BRIAN HENSLEY<sup>1</sup>, Tektronix —

<sup>1</sup>Brian has worked at Tektronix for 9 years, the last few as a Product Marketing Manager working on current and next generation products such as Low Profile digitizers and oscilloscopes.

**F1.00051 Software for Simulation and Processing Photonic Doppler Velocimetry data and system characterization.**<sup>1</sup> , NIKOLA STAN, None —

<sup>1</sup>Traverse Solutions & Instrumentation, LLC

**F1.00052 Modeling of ultrashort pulsed laser induced stress field evolution.** , JIAMIN LIU, HAO JIANG, SHIYUAN LIU, Huazhong University of Science and Technology —

**F1.00053 Proton radiography of a double shock into cerium to get densities of the second shock state** , FRANK CHERNE, BRIAN JENSEN, ZHAOWEN TANG, MATTHEW FREEMAN, Los Alamos National Laboratory —

**F1.00054 Explosive vessel for Synchrotron Experiments** , JOSEPH RIVERA, Los Alamos National Laboratory —

**F1.00055 Quantum dots as optomechanical sensors for mesoscale time-resolved probing of pressure during shock-compression of heterogeneous materials**<sup>1</sup> , KARLA WAGNER, GILL BIESOLD-MCGEE, GREG KENNEDY, Georgia Institute of Technology, DIDIER MONTAIGNE, Defense Threat Reduction Agency (DTRA), ZHITAO KANG, ZHIQUN LIN, NARESH THADHANI, Georgia Institute of Technology —

<sup>1</sup>DTRA Grant HDTRA-18-1-004

**F1.00056 6D Metaimaging; a new frontier for National Facility Science**<sup>1</sup>, CHRISTOPH RAU, Diamond Light Source, MICHAEL BAKER, SARAH BATTS, NEIL BOURNE, University of Manchester, SOFIA DIAZ-MORENO, Diamond Light Source, DAVID EASTWOOD, ALEX GREENAWAY, SARA NONNI, CHRISTOPHER PARLETT, KALPANI VITHERANA, PAUL WADY, ROBERT WEATHERUP, University of Manchester, UOMAH TEAM, DIAMOND LIGHT SOURCE TEAM —

<sup>1</sup>UoM, DLS, STFC, UKAEA, HSE, Rosalind Franklin Institute, Faraday Institution, Ada Lovelace Centre

**F1.00057 Triboluminescent Sensor for Detection of Impacts of Sub-millimeter Explosion Fragments**<sup>1</sup>, GEOFFREY CHASE, SAM GOROSHIN, DAVID L. FROST, McGill University —

<sup>1</sup>Support for this work was provided by the Defense Threat Reduction Agency under contract HDTRA1-16-1-0016-P00001 (program manager Douglas Allen Dalton).

**F1.00058 Correction of Flyer Velocimetry Traces for Experiments with Large Taylor Angles**, JASON LOISEAU, Royal Military College of Canada, XIAOCHENG MI, University of Cambridge, ANDREW J. HIGGINS, McGill University —

**F1.00059 A Method for Obtaining Melt Curves using Laser Compression and X-Ray Diffraction**<sup>1</sup>, CAROLINE LUMSDON, ANDREW HIGGINBOTHAM, University of York —

<sup>1</sup>This work was supported by the Engineering and Physical Sciences Research Council [EP/L01663X/1] and AWE

**F1.00060 Dynamic compression of magnesium hydride in ultrahigh pressure regime using high intensity laser**, SHINTARO MORIOKA, NORIMASA OZAKI, Graduate School of Engineering, Osaka Univ, TAKUO OKUCHI, Inst., for Study of the Earths Interior, Okayama Univ, TAKAYOSHI SANO, KOHEI MIYANISHI, Institute of Laser Engineering, Osaka Univ, YUHEI UMEDA, KENTO KATAGIRI, NOBUKI KAMIMURA, RYOSUKE KODAMA, Graduate School of Engineering, Osaka Univ —

**F1.00061 ABSTRACT WITHDRAWN** —

**F1.00062 Ultrafast Spectroscopic Studies of Vibrational Energy Transfer in Energetic Materials**, NEIL COLE-FILIPAK, Sandia National Laboratories California, MICHAEL MARQUEZ, ROBERT KNEPPER, ROBERT HARMON, PAUL SCHRADER, MITCHELL WOOD, KRUPA RAMASESHA, Sandia National Laboratories —

**F1.00063 In situ X-ray diffraction of shock-compressed diamondoid**, SOVANNDARA HOK, SULGIYE PARK, Stanford University, ARIANNA GLEASON, SLAC National Accelerator Laboratory, SUZANNE ALI, Lawrence Livermore National Laboratory, DYLAN RITTMAN, Stanford University, FENG KE, JEREMY DAHL, ROBERT CARLSON, ERIC GALTIER, SLAC National Accelerator Laboratory, NIR GOLDMAN, Lawrence Livermore National Laboratory, WENDY MAO, Stanford University, YU LIN, SLAC National Accelerator Laboratory —

**F1.00064 Development and Characterisation of a Sapphire Material Graded Areal Density Ramp Loading System**, MICHAEL GOFF, SIMON FINNEGAN, JEREMY MILLETT, JAMES FERGUSON, AWE

**F1.00065 Results on preheated shock and ramp compressed material: experiments on Tin.**, CAMILLE CHAUVIN, THIERRY D'ALMEIDA, CEA Gramat —

**F1.00066 An Explosively-Driven Multi-Flyer System for Investigating Fragment Impact Initiation of PBXs**<sup>1</sup>, JOHN YEAGER, PATRICK BOWDEN, ANDREW SCHMALZER, JOSEPH LICHTHARDT, Los Alamos National Laboratory —

<sup>1</sup>The Authors wish to acknowledge funding from Nuclear Science Research and Development and the Joint Munitions Program

**F1.00067 Plate Impact-Based Isentropic Compression Driver.**, AMIT TSABARY, Rafael LTD —

**F1.00068 Explosive Compaction of Additively Manufactured Material**, PHILLIP MULLIGAN, CODY LOUGH, DOUGLAS BRISTOW, Missouri University of Science and Technology, ED KINZEL, University of Notre Dame, CATHERINE JOHNSON, Missouri University of Science and Technology —

**Tuesday, June 18, 2019 8:00AM - 9:00AM** —  
Session G1 Plenary Session II Grand Ballroom I/II - Joe Zaug

**8:00AM G1.00001 Quantitative x-ray phase contrast imaging during dynamic deformation and fracture**, TODD HUFNAGEL, Johns Hopkins University —

## Tuesday, June 18, 2019 9:15AM - 10:45AM –

Session H1 DSIC: Shock-to-detonation Transition Grand Ballroom I - Ryan Wixom, SNL

**9:15AM H1.00001 Carbon condensation subsequent to ultrafast compression of cryogenic liquid CO<sup>1</sup>**, MICHAEL ARMSTRONG, REBECCA LINDSEY, NIR GOLDMAN, MICHAEL NIELSEN, ELISSAIOS STAVROU, JOSEPH ZAUG, SORIN BASTEVA, Lawrence Livermore Natl Lab —

<sup>1</sup>Lawrence Livermore National Laboratory is operated by Lawrence Livermore National Security, LLC, for the U.S. Department of Energy, National Nuclear Security Administration under Contract DE-AC52-07NA27344.

**9:30AM H1.00002 Shock initiation of Cyclotol (75/25) at both ambient temperature and 70 °C**, MALCOLM BURNS, JUSTIN JONES, ANDREW HOULTON, BRIAN BARTRAM, Los Alamos National Laboratory —

**9:45AM H1.00003 Predicting the effects of thermally-induced density gradients on the hydrodynamic behavior of PBX 9502**, JOHN YEAGER, LEE PERRY, AMANDA DUQUE, XIA MA, GENEVIEVE WATT, Los Alamos National Laboratory —

**10:00AM H1.00004 Commonalities in the Shock-to-Detonation-Transition Acceleration Profiles for PBX 9502**, SCOTT JACKSON, Los Alamos National Laboratory —

**10:15AM H1.00005 A Volumetric Approach to Shock Initiation of Triaminotrinitrobenzene (TATB)**, MIKE BOWDEN, Los Alamos National Laboratory —

**10:30AM H1.00006 Experimental characterization of the shock to detonation transition in TX1 HMX-TATB based explosive using embedded electromagnetic particle velocity gauges**, ARNAUD SOLLIER, CEA, DAM, DIF, F-91297 Arpajon, France, PHILIPPE HEBERT, ROLAND LETREMY, VINCENT MINEAU, XAVIER BOISSY, ERIC PIONNEAU, MICHEL DOUCET, ERIC BOUTON, CEA, DAM, Le Ripault, F-37260, Monts, France —

## Tuesday, June 18, 2019 9:15AM - 10:45AM –

Session H2 ERM: Synthesis and sensitivity of energetic materials Grand Ballroom II - Timothy Jenkins, ARL

**9:15AM H2.00001 Examining Different Regimes of Explosives Handling Sensitivity**, VIRGINIA MANNER, NICHOLAS LEASE, MARC CAWKWELL, CLAYTON TIEMANN, GEOFFREY BROWN, JOHN YEAGER, LISA KAY, DAVID CHAVEZ, Los Alamos National Laboratory —

**9:30AM H2.00002 Synthesis of Heterocyclic Primary Explosives**, DAVID CHAVEZ, Los Alamos National Laboratory, ELLEN DENNING, Purdue University —

**9:45AM H2.00003 Synthesis and Sensitivity Studies of PETN and ETN Derivatives**, NICHOLAS LEASE, VIRGINIA W. MANNER, DAVID E. CHAVEZ, DAVID ROBBINS, LISA KAY, Los Alamos National Laboratory —

**10:00AM H2.00004 Data-Driven Retrosynthetic Predictions for Energetic Materials**, MICHAEL FORTUNATO, CONNOR COLEY, MIT, BRIAN BARNES, ARL, IGOR SCHWEIGERT, NRL, ARIANA BESTE, ARL, KLAUS JENSEN, MIT —

**10:15AM H2.00005 High Pressure Chemistry as a Route Toward Novel Energetic Materials Using First Principles Crystal Structure Prediction<sup>1</sup>**, BRAD STEELE, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the U. S. Department of Energy by Lawrence Livermore National Security, LLC under Contract DE-AC52-07NA27344. Thanks to the Laboratory Directed Research and Development Program at LLNL for supporting this study under 18-SI-004.

## Tuesday, June 18, 2019 9:15AM - 10:45AM –

Session H3 AETD: Spectroscopy Pavilion East - Joe Zaug, LLNL

**9:15AM H3.00001 Measuring Fast and Slow Energy Release from Aluminum Powders**, JENNIFER GOTTFRIED, STEVEN DEAN, CHI-CHIN WU, FRANK DE LUCIA, JR., US Army Research Lab - APG —

**9:30AM H3.00002 Optical Emissions from Spherical Charges** , NICK GLUMAC, University of Illinois, ALLEN KUHL, Lawrence Livermore Natl Lab —

**9:45AM H3.00003 Fast mid-infrared spectroscopy of gases: measurement method during a H<sub>2</sub>/O<sub>2</sub> deflagration<sup>1</sup>** , MARIE DABOS, CEA-GRAMAT, KHANH-HUNG TRAN, LEME, Paris Nanterre University, NICOLAS LECYSYN , GERARD BAUDIN, MARC GENETIER, CEA-GRAMAT, ISABELLE RANC, BRUNO SERIO, LEME, Paris Nanterre University —

<sup>1</sup>We thank the DGA for its financial support.

**10:00AM H3.00004 Coherent anti-Stokes Raman Spectroscopy (CARS) used to measure the temperature of shocked deuterium and hydrogen gas.** , JASON MANCE, Mission Support and Test Services —

**10:15AM H3.00005 A comparison of infrared, Raman and coherent Raman spectroscopies in studies of shock-induced chemistry** , DAVID MOORE, CYNTHIA BOLME, KATHRYN (KATIE) BROWN, MARGO GREENFIELD, SHAWN MCGRANE, Los Alamos National Laboratory —

**10:30AM H3.00006 Finite Crystal Size Effects in Dynamic Diffraction Experiments on 4th Generation Light Sources** , JUSTIN WARK, EDWARD ROWE, OLIVER KARNBACH, DAVID MCGONEGLE, JACK FRASER, OLIVER HUMPHRIES, University of Oxford —

**Tuesday, June 18, 2019 9:15AM - 10:30AM —**  
Session H4 MS: Strength & Spall II Pavilion West - George T. Gray III, LANL

**9:15AM H4.00001 Measurements of Rayleigh-Taylor growth in solid and liquid copper in the Mbar regime<sup>1</sup>** , JAMES MCNANEY, SHON PRISBREY, CHANNING HUNTINGTON, HYE-SOOK PARK, Lawrence Livermore National Laboratory, BRUCE REMINGTON, None, DAMIAN SWIFT, CHRIS WEHREBERG, TOM ARSENLIS, Lawrence Livermore National Laboratory —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344

**9:30AM H4.00002 Results of Rayleigh-Taylor tantalum strength experiments at high pressure and high strain rates on NIF<sup>1</sup>** , HYE-SOOK PARK, N. R. BARTON, C. M. HUNTINGTON, P. D. POWELL, S. PRISBREY, B. A. REMINGTON, R. E. RUDD, D. C. SWIFT, C. E. WEHREBERG, A. ARSENLIS, J. M. MCNANEY, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

**9:45AM H4.00003 Exploiting the Unique Capabilities of Richtmyer-Meshkov Instability Strength Measurements at Extreme Strain Rates** , MICHAEL PRIME<sup>1</sup>, Los Alamos National Laboratory —

<sup>1</sup>Collaborators: William T. Buttler, Saryu J. Fensin, David R. Jones, Los Alamos National Laboratory; Justin L. Brown, Sandia National Laboratories

**10:15AM H4.00004 High-pressure Pb and Pb-4wt%Sb strength measurements at the National Ignition Facility<sup>1</sup>** , ANDREW KRYGIER, PHILIP POWELL, JIM MCNANEY, CHANNING HUNTINGTON, SHON PRISBREY, BRUCE REMINGTON, ROB RUDD, DAMIAN SWIFT, CHRIS WEHREBERG, TOM ARSENLIS, HYE-SOOK PARK, Lawrence Livermore National Laboratory, PETER GRAHAM, ED GUMBRELL, MATT HILL, ANDREW COMLEY, STEVE ROTHMAN, Atomic Weapons Establishment —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

**Tuesday, June 18, 2019 9:15AM - 10:30AM —**  
Session H5 BIEP: Penetration I Broadway I/II - James Walker, SWRI

**9:15AM H5.00001 Structure-Property Relationships at the Extremes** , CYRIL WILLIAMS, US Army Rsch Lab - Aberdeen —

**9:45AM H5.00002 Reaction Initiation of Metal Spheres Upon Ballistic Impact with an ANVIL<sup>1</sup>** , DIHIA IDRICI, McGill University, MICHAEL J. SOO, NSWC Indian Head, SAM GOROSHIN, ANDREW J. HIGGINS, DAVID L. FROST, McGill University —

<sup>1</sup>Support for this work was provided by the Defense Threat Reduction Agency under contract HDTRA1-16-1-0016-P00001 (program manager Douglas Allen Dalton).

**10:00AM H5.00003 Experimental methodology for measuring and constraining numerical simulation parameters of microwave damaged concrete under ballistic impact<sup>1</sup>** , GARETH TEAR, WILLIAM PROUD, Imperial College London —

<sup>1</sup>The project or effort depicted was or is sponsored by the Department of the Defense, Defense Threat Reduction Agency. The content of the information does not necessarily reflect the position or the policy of the federal government, and no official endorsement should be inferred

**10:15AM H5.00004 A constitutive model for dry soils under a wide range of pressures** , ERIC HERBOLD, MICHAEL HOMEL, Lawrence Livermore Natl Lab, M.B. RUBIN, Israel Institute of Technology —

**Tuesday, June 18, 2019 9:15AM - 10:45AM —**

**Session H6 TMS: First-principles and Molecular Dynamics II** Broadway III/IV - Rebecca Lindsey, LLNL

**9:15AM H6.00001 New GSD modeling for air blast wave supported by non-uniform flow** , SUNHEE YOO, Torch Technologies, GEORGE BUTLER, University of Dayton Research Institute; Air Force Research Laboratory —

**9:30AM H6.00002 Inverse Problem for PSPI Experiments** , RODNEY CLIFTON, SIYUAN SONG, TONG JIAO, Brown University, SCHOOL OF ENGINEERING, BROWN UNIVERSITY TEAM —

**9:45AM H6.00003 Improved data processing for frequency domain interferogram** , ZHICHENG ZHONG, HAO JIANG, SHIYUAN LIU, Huazhong University of Science and Technology —

**10:00AM H6.00004 Shaped Charge Automated Design: Applying DAKOTA to Kinetic Energy Optimization** , SEBASTIAN KONEWKO, JOHN BORG, Marquette University —

**10:15AM H6.00005 A parallel algorithm to create long polymer chains in molecular dynamics<sup>1</sup>** , NICOLAS PINEAU, CLAIRE LEMARCHAND, DAVID BOUSQUET, CEA/DAM/DIF, BENOIT SCHNELL, Michelin —

<sup>1</sup>Fundings from the PIA project SMICE (Simulation de Matériaux pour l'Industrie par Calcul Exaflop)

**10:30AM H6.00006 Materials Dynamics Descriptors Determined by MD Data.** , SVEN RUDIN, Los Alamos National Laboratory —

**Tuesday, June 18, 2019 11:00AM - 12:30PM —**

**Session J1 DSIC: Detonation Modeling I** Grand Ballroom I - Gerrit Sutherland, ARL

**11:00AM J1.00001 SDOT: A Three-dimensional Mesh-free Detonation Tracking Package<sup>1</sup>** , JIN YAO, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

**11:15AM J1.00002 Toward a Reactive Flow Model Calibration Methodology Using Streamline-Based Fast-Running Models** , MICHAEL CROCHET, University of Dayton Research Institute/AFRL, SUNHEE YOO, Torch Technologies/AFRL —

**11:30AM J1.00003 Mirrored continuum and molecular scale simulations of deflagration in a nano-slab of HMX<sup>1</sup>** , D. SCOTT STEWART, Mechanical and Aerospace Engineering, University of Florida

<sup>1</sup>GRANT: Supported by Office of Naval Research, Code 35



**12:00PM J1.00004 Meso-Informed Scaled Unified Reactive Front (MISURF) burn model for the shock response of pressed HMX** , SANGYUP LEE, OISHIK SEN, SIDHARTHA ROY, H.S. UDAYKUMAR, University of Iowa —

**12:15PM J1.00005 Using the Pagosa SURF model to simulate fragment impact on energetic materials for safety applications<sup>1</sup>** , XIA MA, BRAD CLEMENTS, Los Alamos National Laboratory —

<sup>1</sup>This work was funded by ASC-PEM-HE, NCT, and ASC Safety Program. We gratefully thank Dave Zerkle, Tariq Aslam, Mike Burkett, and Brandon Smith for their support of the project.

**Tuesday, June 18, 2019 11:00AM - 12:15PM —**

**Session J2 ERM: Novel energetic molecules and formulations** Grand Ballroom II - Mike Grapes, LLNL

**11:00AM J2.00001 Investigation of Explosive Spin Crossover Complexes for On-Demand Initiation Sensitivity and Energetic Polymers for Additive Manufacturing** , THUY-AI NGUYEN, DAVID CHAVEZ, ALEXANDER MUELLER, BRYCE TAPPAN, JACQUELINE VEAUTHIER, Los Alamos National Laboratory —

**11:15AM J2.00002 Recent advances in the development of FATP as a photoactive energetic material** , CHRISTOPHER SNYDER, PATRICK BOWDEN, KATHRYN BROWN, MICHAEL BOWDEN, STEVEN CLARKE, Los Alamos National Laboratory —

**11:30AM J2.00003 The Promise and Challenge of Extended Solids of Nitrogen** , JENNIFER CIEZAK-JENKINS, TIMOTHY JENKINS, JONATHAN BENNION, US Army Rsch Lab - Aberdeen —

**11:45AM J2.00004 Development of Promoters for Hypergolic Reactions with Hydrogen Peroxide** , MICHAEL GOZIN, Tel Aviv University —

**Tuesday, June 18, 2019 11:00AM - 12:30PM —**

**Session J3 AETD: Velocimetry 1** Pavilion East - Mike Bowden, LANL

**11:00AM J3.00001 Characterizing Performance of Broadband Laser Ranging<sup>1</sup>** , MICHELLE RHODES<sup>2</sup>, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344 and by Mission Support and Test Services, LLC, under Contract DE-NA0003624.

<sup>2</sup>Corey Bennett and Daniel Perry (Lawrence Livermore National Lab); Jared Catenacci, Vu Tran, Carlos Perez, and Michael Hanache (Nevada National Security Site)

**11:30AM J3.00002 High Resolution Broadband Laser Ranging** , ANDREA ALBERT, Los Alamos National Laboratory —

**11:45AM J3.00003 Novel Techniques in Photonic Doppler Velocimetry** , PATRICK YOUNK, Los Alamos National Laboratory —

**12:00PM J3.00004 Simultaneous Green and Infrared PDV** , MATTHEW BRIGGS, ANDREA ALBERT, PATRICK YOUNK, Los Alamos National Laboratory —

**12:15PM J3.00005 Dark-fringe velocimeter for measuring fast transient features in shock wave profiles with 1 m/s precision and 50 ps time resolution<sup>1</sup>** , B. LA LONE, E. MILLER, E. LARSON, J. WESOLOWSKI, Nevada National Security Site, Special Technologies Laboratory, Santa Barbara 93111, STL TEAM —

<sup>1</sup>This work was done by Mission Support and Test Services, LLC, under Contract No. DE-NA0003624, with the U. S. Department of Energy and supported by the Site-Directed Research and Development Program

**Tuesday, June 18, 2019 11:00AM - 12:30PM —**

**Session J4 MS: Strength & Spall III** Pavilion West - Kathy Prestridge, LANL

**11:00AM J4.00001 Constraining flow stress models at high strain-rates through in-situ imaging of hole closure under dynamic compression<sup>1</sup>** , JONATHAN LIND, ANDREW ROBINSON, MATTHEW NELMS, NATHAN BARTON, MUKUL KUMAR, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy (US-DOE) by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344. Part of this work was performed at the Dynamic Compression Sector at the Advanced Photon Source (APS) supported by the US-DOE, National Nuclear Security Administration, under Award Number DE-NA0002442. This research used resources of the APS, a US-DOE Office of Science User Facility operated for the DOE Office of Science by Argonne National Laboratory under Contract No. DE-AC02-06CH11357.

**11:15AM J4.00002 Effect of stress triaxiality on damage behavior of AM pure copper in a wide range of strain rate** , GIANLUCA IANNITTI, ANDREW RUGGIERO, NICOLA BONORA, University of Cassino and Southern Lazio, MARTINA RICCIO, MICHELE ANTOLOTTI, GABRIELE RIZZI, BeamIT, MARIANO ZARCONI, DIEGO CORONA, Fondazione E. Amaldi —

**11:30AM J4.00003 ABSTRACT WITHDRAWN —**

**11:45AM J4.00004 Strength Characterization of Ductile Materials in Dynamic Tension from SHTB Data** , AVISHAY LINDENFELD, Rafael Advanced Defense Systems, YEHUDA PARTOM, Retired from Rafael —

**12:00PM J4.00005 Development of tensile SHPB system and properties of AM Maraging steel.** , CHRISTOPHER BRAITHWAITE, DAVID WILLIAMSON, NICHOLAS TAYLOR, University of Cambridge —

**12:15PM J4.00006 Is there an upturn phenomenon in the strength of metals at strain rates of  $10^3$ - $10^4$  s<sup>-1</sup>?** , YEHEZKEL ASHUACH, ZVI ROSENBERG, ROMAN KOSITSKI, ALON MALKA-MARKOVITZ, Rafael Advanced Defense Systems, Ltd. —

**Tuesday, June 18, 2019 11:00AM - 12:15PM —**

**Session J5 BIEP: Fragmentation II** Broadway I/II - Cameron Stewart, Indian Head

**11:00AM J5.00001 Investigation of the Effects of Confinement on Particle Jet Formation in Cylindrical Explosive Dispersal of Particles<sup>1</sup>** , BERTRAND ROLLIN, Embry-Riddle Aeronautical University, FREDERICK OUELLET, RAHUL KONERU, JOSHUA GARNO, University of Florida - CCMT —

<sup>1</sup>This work was supported by the U.S. Department of Energy, National Nuclear Security Administration, Advanced Simulation and Computing Program, as a Cooperative Agreement under the Predictive Science Academic Alliance Program, Contract No. DE-NA0002378.

**11:15AM J5.00002 Performance of Erosion and Cohesive Methods in Predicting Fragmentation of Metallic Composites<sup>1</sup>** , S. K. DWIVEDI, A. A. REINERT, D. STAMATIS, H. ARBELO-LOPEZ, NSWC Indian Head EOD Technology Division; Research, Development, Test and Evaluation Department; Materials Science Branch, Indian Head, MD 20640 —

<sup>1</sup>This work is supported by NSWC IHEODTD 219-NISE and Office of Naval Research grants. Approved for Public Release (19-015).

**11:30AM J5.00003 Investigating the Detonation and Resulting Flow in an Explosive Multiphase Experiment with Uncertainty Quantification** , JOSHUA GARNO, FREDERICK OUELLET, RAHUL KONERU, THOMAS JACKSON, S. BALACHANDAR, University of Florida, BERTRAND ROLLIN, Embry-Riddle Aeronautical University —

**11:45AM J5.00004 Blast Driven Multiphase Instability from the Energetic Dispersal of a Perturbed Particle Bed** , FREDERICK OUELLET, RAHUL BABU KONERU, JOSHUA GARNO, S. BALACHANDAR, University of Florida, BERTRAND ROLLIN, Embry-Riddle Aeronautical University —

**12:00PM J5.00005 Grain-scale numerical studies of explosive driven particle jetting<sup>1</sup>** , KUN XUE, Beijing Institute of Technology —

<sup>1</sup>National Natural Science Foundation of China (Grant U1730111)

**Tuesday, June 18, 2019 11:00AM - 12:30PM —**

**Session J6 TMS: First-principles and Molecular Dynamics III** Broadway III/IV - Brian Barnes, ARL

**11:00AM J6.00001 Machine Learning Reactive Force Fields for an Atomistically-Resolved View into Shockwave-Driven Carbon Condensation**, REBECCA LINDSEY, Lawrence Livermore Natl Lab —

**11:30AM J6.00002 Machine Learning of Interatomic Potentials for Shock Compression Phenomena<sup>1</sup>**, BENJAMIN NEBGEN, KIPTON BARROS, LEONID BURAKOVSKY, SARYU FENSIN, TIMOTHY GERMANN, NICHOLAS LUBBERS, JUSTIN SMITH, Los Alamos National Laboratory —

<sup>1</sup>Los Alamos National Laboratory is operated by Triad National Security, LLC, for the National Nuclear Security Administration of U.S. Department of Energy (Contract No. 89233218CNA000001).

**11:45AM J6.00003 Quantum-accurate SNAP carbon potential for MD shock simulations**, JONATHAN WILLMAN, ASHLEY WILLIAMS, KIEN NGUYEN CONG, University of South Florida, MITCHELL WOOD, AIDAN THOMPSON, Sandia National Laboratories, IVAN OLEYNIK, University of South Florida —

**12:00PM J6.00004 Transferable kinetic Monte Carlo models of condensed phase high temperature chemistry learned from molecular dynamics data.<sup>1</sup>**, QIAN YANG, University of Connecticut, ENZE CHEN, VINCENT DUFOUR-DECIEUX, Stanford University, CARLOS SING-LONG, Pontificia Universidad Catolica de Chile, RODRIGO FREITAS, EVAN REED, Stanford University —

<sup>1</sup>This work was supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0002007. This work was also partially supported by NSF Grant DMR-1455050.

**12:15PM J6.00005 Machine-learning based multi-scale model for shock-particle interactions**, OISHIK SEN, University of Iowa, SOREN TAVERNIERS, San Diego State University, PRATIK DAS, University of Iowa, GUSTAAF JACOBS, San Diego State University, H.S. UDAYKUMAR, University of Iowa —

## **Tuesday, June 18, 2019 2:00PM - 3:30PM —**

Session K1 DSIC: Detonation Modeling II Grand Ballroom I - Nicholas Whitworth, AWE

**2:00PM K1.00001 A study of shock initiation experiments for the explosive PBX 9502 using three reactive burn models**, MATTHEW PRICE, Los Alamos National Laboratory —

**2:15PM K1.00002 Evaluation of XHVRB for Capturing Transition to Detonation as Measured with Embedded Gauges**, LEAH TUTTLE, JEFF LAJEUNESSE, ROBERT SCHMITT, ERIC HARSTAD, Sandia National Laboratories —

**2:30PM K1.00003 The Statistical Hot Spot Model: Dimensionality and the Effects of Time-Distributed Nucleation**, LARRY HILL, Los Alamos National Laboratory —

**2:45PM K1.00004 A Morphologically Aware Model for TATB Based Explosives<sup>1</sup>**, JAMES GAMBINO, ALBERT NICHOLS, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

**3:00PM K1.00005 WGT: toward a microstructure-aware reactive burn model**, MAXIME REYNAUD, REMY SORIN, VINCENT DUBOIS, NICOLAS DESBIENS, CEA/DAM/DIF, F-91297 Arpajon, France —

**3:15PM K1.00006 High Explosive Shock Initiation Model Based on Hot Spot Temperature<sup>1</sup>**, LAURENCE FRIED, MATTHEW KROONBLAWD, Lawrence Livermore Natl Lab —

<sup>1</sup>Lawrence Livermore National Laboratory is operated by Lawrence Livermore National Security, LLC, for the U.S. Department of Energy, National Nuclear Security Administration under Contract DE-AC52-07NA27344.

## **Tuesday, June 18, 2019 2:00PM - 3:30PM —**

Session K2 ERM: Reactive powders and nanoenergetics Grand Ballroom II - Robert Knepper, SNL

**2:00PM K2.00001 Combined fragment recovery and overpressure measurements from a reactive material cased charge**, JOSEPH HOOPER, JACOB KLINE, Naval Postgraduate School —

**2:15PM K2.00002 Shock initiation of reactive nanolaminates** , SERGEY MATVEEV, DANA DLOTT, University of Illinois at Urbana-Champaign, PETRA HANUSOVA, JON-PAUL MARIA, Penn State University —

**2:30PM K2.00003 Effect of liquid process control agent on structure and morphology of reactive materials prepared by high-energy milling** , EDWARD L. DREIZIN, New Jersey Institute of Technology —

**3:00PM K2.00004 Numerical simulation of explosively-dispersed reactive powder** , RYAN HOUIM, University of Florida —

**3:15PM K2.00005 Helium Droplet Mediated Cluster Assembly as a Tool to Probe the Limits of Energy Storage in Metastable Nanomaterials** , CLARON RIDGE, KYLE OVERDEEP, Air Force Research Lab/University of Dayton Research Institute, ROBERT BUSZEK, JERRY BOATZ, MICHAEL LINDSAY, Air Force Research Lab —

**Tuesday, June 18, 2019 2:00PM - 3:30PM —**  
Session K3 AETD: Velocimetry 2 Pavilion East - Michelle Rhodes, LLNL

**2:00PM K3.00001 A direct comparison of transverse velocimetry techniques using photon Doppler velocimetry (PDV) in oblique impact experiments<sup>1</sup>** , CHRISTOPHER JOHNSON, JOHN BORG, Marquette University, SCOTT ALEXANDER, Sandia National Laboratories —

<sup>1</sup>SNL is managed and operated by NTESS under DOE NNSA contract DE-NA0003525

**2:15PM K3.00002 Uncertainty Analysis for Transverse Surface Velocity Measurements** , JEFF LAJEUNESSE, Sandia National Laboratories, PETER SABLE, JOHN BORG, Marquette University —

**2:30PM K3.00003 Fundamental limits of time-resolved velocimetry<sup>1</sup>** , DAN DOLAN, Sandia National Laboratories , DARRELL RAMSEY, Mission Support and Test Services, LLC —

<sup>1</sup>Sandia National Labs is managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a subsidiary of Honeywell International, Inc., for the U.S Dept. of Energy's National Nuclear Security Administration under contract DE-NA0003525.

**2:45PM K3.00004 Fitting Photonic Doppler Velocimetry Spectrograms with Likelihood Methods** , PATRICK HARDING, Los Alamos National Laboratory —

**3:00PM K3.00005 Forward modeling of Doppler velocity interferometer and detector blurring for improved high time resolution shockwave measurement<sup>1</sup>** , DAVID ERSKINE, Lawrence Livermore Natl Lab —

<sup>1</sup>Prepared by LLNL under Contract DE-AC52-07NA27344.

**3:15PM K3.00006 PDV test of acceleration and impact onto LiF window of a flyer driven by electric explosion** , WANG WANJUN, LEI FAN, ZHU MINGSHUI, FU QIUBO, China Academy of Engineering Physics —

**Tuesday, June 18, 2019 2:00PM - 3:30PM —**  
Session K4 MS: Strength & Spall IV Pavilion West - Carl Trujillo, Los Alamos National Laboratory (LLNL)

**2:00PM K4.00001 Fast Strength Model Parameter Optimization and Model Comparison Using Bayesian Statistics<sup>1</sup>** , AYAN BISWAS, DAVID WALTERS, DEVIN FRANCOM, EARL LAWRENCE, DARBY LUSCHER, SKY SJUE, JAMES AHRENS, Los Alamos National Laboratory —

<sup>1</sup>Funded by U.S. Department of Energy - Advanced Simulation and Computing

**2:15PM K4.00002 The Integration Schemes of the Preston-Tonks-Wallace (PTW) Viscoplasticity Model** , JEEYEON PLOHR, Los Alamos National Laboratory —

**2:30PM K4.00003 Shear Band Insertion for Capturing Strain Localization** , JONATHAN MARGRAF, Lawrence Livermore Natl Lab —

**2:45PM K4.00004 Modeling High Rate Stress Upturn for Brittle Materials** , YEHUDA PARTOM, Retired —

**3:00PM K4.00005 Features of Fourth Power Behavior of Structured Shock Waves in Selected Solids** , DENNIS GRADY, Applied Research Associates —

**3:15PM K4.00006 ABSTRACT WITHDRAWN** —

**Tuesday, June 18, 2019 2:00PM - 3:30PM** —

**Session K5 BIEP: Ejecta III** Broadway I/II - Leo Kirsch, LLNL

**2:00PM K5.00001 Studies of reactive and nonreactive metalsejectatransporting in nonreactive and reactive gases and vacuum** , WILLIAM BUTTLER, LANL —

**2:30PM K5.00002 Elastic properties of polycrystalline cerium hydrides and deuterides measured using resonant ultrasound spectroscopy<sup>1</sup>** , ADITYA SHIVPRASAD, TARIK SALEH, Materials Science and Technology, Los Alamos National Laboratory, JOSEPH WERMER, Sigma Division, Los Alamos National Laboratory, ROLAND SCHULZE, Weapons Systems Engineering, Los Alamos National Laboratory, WILLIAM BUTTLER, Physics Division, Los Alamos National Laboratory —

<sup>1</sup>The authors would like to thank the LANL Laboratory Directed Research and Development (LDRD) program for supporting this research.

**2:45PM K5.00003 Compressible Particle Drag Experiments at Los Alamos National Laboratory** , KYLE HUGHES, ADAM MARTINEZ, ANKUR BORDOLOI, KATHERINE PRESTRIDGE, Los Alamos National Laboratory

**3:00PM K5.00004 Measuring the Spatial Evolution of Ejecta Transport Using Particle Image Velocimetry<sup>1</sup>** , JOHN CHARONKO, JOHNNY GOETT, Los Alamos National Laboratory, MICHAEL GROVER, BRANDON LA LONE, JASON MANCE, MSTs Special Technologies Laboratory, RUBEN MANZANARES, JOHN MARTINEZ, DEREK SCHMIDT, Los Alamos National Laboratory, GERALD STEVENS, WILLIAM TURLEY, MSTs Special Technologies Laboratory, WILLIAM BUTTLER, Los Alamos National Laboratory —

<sup>1</sup>This research is funded by the Los Alamos National Laboratory LDRD Directed Research

**3:15PM K5.00005 Ejected particle size distributions from shocked Cerium targets<sup>1</sup>** , MARTIN SCHAUER, WILLIAM BUTTLER, Physics Division, Los Alamos National Laboratory, MICHAEL GROVER, Special Technologies Laboratory, Mission Support and Test Services, LLC, RUBEN MANZANARES, Physics Division, Los Alamos National Laboratory, JOHN MARTINEZ, DEREK SCHMIDT, Material Science Division, Los Alamos National Laboratory, GERALD STEVENS, WILLIAM TURLEY, Special Technologies Laboratory, Mission Support and Test Services, LLC —

<sup>1</sup>This work is supported by the LANL Laboratory Directed Research and Development program.

**Tuesday, June 18, 2019 2:00PM - 3:30PM** —

**Session K6 TMS: First-principles and Molecular Dynamics IV** Broadway III/IV - Shailesh Mehta, AWE

**2:00PM K6.00001 Molecular dynamics study of shock waves in iron-carbon single crystals** , HOANG-THIEN LUU, NINA GUNKELMANN, Computational Material Sciences/Engineering, Institute of Applied Mechanics, Clausthal University of Technology, 38678 Clausthal-Zellerfeld, Germany —

**2:15PM K6.00002 ABSTRACT WITHDRAWN** —

**2:30PM K6.00003 Heating of tantalum upon shock breakout from a free surface** , P.G. HEIGHWAY, M. SLIWA, D. MCGONEGLE, U. of Oxford, C. WEHRENBERG, LLNL, C.A. BOLME, LANL, J. EGGERT, LLNL, A. HIGGINBOTHAM, U. of York, A. LAZICKI, LLNL, H.-J. LEE, B. NAGLER, LCLS, H.-S. PARK, R.E. RUDD, R.A. SMITH, LLNL, M.J. SUGGIT, U. of Oxford, D. SWIFT, LLNL, F. TAVELLA, LCLS, B.A. REMINGTON, LLNL, J.S. WARK, U. of Oxford —

**2:45PM K6.00004 Anomalous Grain Size Dependence of Dynamic Mechanical Properties in Nanocrystalline SiC Ceramics Under Shock Loading** , WANGHUI LI, South China University of Technology, ERIC HAHN, Los Alamos National Laboratory, XIAOHU YAO, South China University of Technology, TIMOTHY GERMANN, BIAO FENG, Los Alamos National Laboratory, XIAOQING ZHANG, South China University of Technology —

**3:00PM K6.00005 Nonequilibrium Molecular Dynamics Simulations of Ejecta Formation in Helium-Implanted Copper** , RACHEL FLANAGAN, SARYU FENSIN, University of California, San Diego, TIMOTHER GERMANN, Los Alamos National Laboratory, MARC MEYERS, University of California, San Diego —

**3:15PM K6.00006 Adaptations of Gurson-based ductile damage models for extreme dynamic loading** , DARBY LUSCHER, TED CARNEY, MILES BUECHLER, Los Alamos National Laboratory —

**Tuesday, June 18, 2019 4:00PM - 5:30PM —**

**Session L1 DSIC: Detonation Modeling III** Grand Ballroom I - Scott Stewart, University of Florida

**4:00PM L1.00001 Modeling the LANL Triple Point Overdrive Experiment in the FLAG Hydrocode** , ADAM COLEMAN, CARL JOHNSON, MATT BISS, Los Alamos National Laboratory —

**4:15PM L1.00002 Effects of Geometry on Line Wave Generator Breakout Profiles Containing XTX-8003** , BRADLEY WHITE, ROBERT REEVES, MICHAEL GRAPES, CRAIG TARVER, DENIS RICHARD, Lawrence Livermore Natl Lab —

**4:30PM L1.00003 Hugoniot Properties of Explosives Forming Multi-Phase Condensed Species** , LEONARD STIEL, NYU Tandon School of Engineering (Retired), PHILIP SAMUELS, US ARMY FUTURES COMMAND, Picatinny Arsenal —

**4:45PM L1.00004 Study on the analog system of non-ideal detonation with two step chemical reaction model** , YUANXIANG SUN, State Key Lab. of Explosion Science and Tech., Beijing Institute of Tech. , CHENG WANG, State Key Laboratory of Explosion Science and Technology, Beijing Institute of Technology, China —

**5:00PM L1.00005 Deep Learning for Energetic Material Detonation Performance** , BRIAN BARNES, US Army Research Laboratory —

**5:15PM L1.00006 AWS D calibration for the HMX based explosives PBX 9501 and LX-07** , TARIQ ASLAM, MATTHEW PRICE, CHRISTOPHER TICKNOR, JEFFERY LEIDING, MARVIN ZOCHER, Los Alamos National Laboratory —

**Tuesday, June 18, 2019 4:00PM - 5:30PM —**

**Session L2 ERM: Advanced and additive manufacturing** Grand Ballroom II - Ryan Wixom, SNL

**4:00PM L2.00001 Diameter effects on the directional anisotropic detonation behavior of strand structured additively manufactured explosives.** , ALEXANDER MUELLER, ANDREW SCHMALZER, PATRICK BOWDEN, BRYCE TAPPAN, ALEXANDER WHITE, RALPH MENIKOFF, Los Alamos National Laboratory —

**4:15PM L2.00002 Investigating Typical Additive Manufacturing Defect Geometries using Physical Vapor Deposition Explosives as a Model System<sup>1</sup>** , CAITLIN O'GRADY, Sandia National Laboratories and Purdue University, ALEXANDER TAPPAN, ROBERT KNEPPER, STEPHEN RUPPER, JONATHAN VASILIAUSKAS, MICHAEL MARQUEZ, Sandia National Laboratories —

<sup>1</sup>Sandia National Laboratories is a multitechnology laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525. SAND2019-2298 A

**4:30PM L2.00003 A Simple 3D Printed Plane Wave Explosive Lens Based on Fritz Parameters** , JOSEPH LICHTHARDT, BRYCE TAPPAN, PATRICK BOWDEN, MILES OLINGER, DANIEL MCDONALD, Los Alamos National Laboratory —

**4:45PM L2.00004 Controlling thermite reactivity with engineered porosity and architecture** , KYLE SULLIVAN, Lawrence Livermore Natl Lab, ELLIOT W, Johns Hopkins University, MICHAEL GRAPES, Lawrence Livermore Natl Lab —

**5:00PM L2.00005 Shock Interactions in Multilayer Explosive Films<sup>1</sup>** , ROBERT KNEPPER, DAVID KITTELL, MICHAEL MARQUEZ, ALEXANDER TAPPAN, Sandia National Laboratories —

<sup>1</sup>Sandia National Laboratories is a multitechnology laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA-0003525. SAND2019-2091A

**5:15PM L2.00006 Detonation Wave Manipulation via Inert 3D Printed Open Cell Siloxane Lattices Backfilled with a Liquid Explosive**, ANDREW SCHMALZER, BRYCE TAPPAN, PATRICK BOWDEN, JOSEPH LICHTHARDT, ALEX MUELLER, RALPH MENIKOFF, Los Alamos National Laboratory —

**Tuesday, June 18, 2019 4:00PM - 5:30PM —**

**Session L3 AETD: Hugoniot Measurements** Pavilion East - Saryu Fensin, LANL

**4:00PM L3.00001 Measurements of Dynamically Compressed Liquid Structure beyond 3 Mbar Using X-Ray Diffraction**, AMY L COLEMAN, RICHARD BRIGGS, FEDERICA COPPARI, AMALIA FERNANDEZ-PANELLA, MARTIN G GORMAN, RAY F SMITH, Lawrence Livermore Natl Lab, SALLY J TRACY, Carnegie Institution for Science, Geophysical Laboratory, JON H EGGERT, DAYNE E FRATANDUONO, Lawrence Livermore Natl Lab —

**4:15PM L3.00002 First observation of bcc gold and melting on the shock Hugoniot measured using x-ray diffraction<sup>1</sup>**, RICHARD BRIGGS, FEDERICA COPPARI, MARTIN GORMAN, RAY SMITH, Lawrence Livermore National Laboratory, SALLY TRACY, Geophysical Laboratory, Carnegie Institution of Washington, AMY COLEMAN, AMALIA FERNANDEZ-PANELLA, MARIUS MILLOT, JON EGGERT, DAYNE FRATANDUONO, Lawrence Livermore National Laboratory —

<sup>1</sup>This work was performed under the auspices of the US Department of Energy by Lawrence Livermore National Laboratory under Contract No. DE-AC52-07NA27344

**4:30PM L3.00003 Ultrahigh-pressure Hugoniot equations of state up to TPa based on three-stage gas gun<sup>1</sup>**, JIANBO HU, XIANG WANG, CHENGDA DAI, QIANG WU, Laboratory for Shock Wave and Detonation Physics, Institute of Fluid Physics, China Academy of Engineering Physics, LABORATORY FOR SHOCK WAVE AND DETONATION PHYSICS TEAM —

<sup>1</sup>This work was supported by Science Challenge Project (No. TZ2018001) and China 1000-Young Talents Plan.

**4:45PM L3.00004 Hugoniot of Meso-Erythritol as an Inert Surrogate for PETN**, ZAKARY WILDE, Los Alamos National Laboratory & Arizona State University, PEDRO PERALTA, Arizona State University —

**5:00PM L3.00005 Hugoniot Temperatures of LiF at High Pressures and Temperatures<sup>1</sup>**, RYAN CRUM, Lawrence Livermore Natl Lab, ERIC DUTRA, MSTs, KATHY OPACHICH, DAWN GRANINGER, DAVID BRANTLEY, RICKY CHAU, MINTA AKIN, Lawrence Livermore Natl Lab —

<sup>1</sup>Work was performed under the auspices of the U.S. DOE by LLNL under Contract DE-AC52-07NA27344.

**5:15PM L3.00006 Gbar-range Hugoniot equation of state of Boron<sup>1</sup>**, AMY LAZICKI, DAMIAN SWIFT, HEATHER WHITLEY, TILO DOEPPNER, MADISON MARTIN, MICHELLE MARSHALL, DAVID ERSKINE, RICHARD LONDON, DAYNE FRATANDUONO, PETER CELLIERS, JON EGGERT, NATALIE KOSTINSKI, BRIAN MADDOX, SHUAI ZHANG, BRIAN WILSON, Lawrence Livermore Natl Lab, WALTER JOHNSON, University of Notre Dame, JOSEPH NILSEN, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344

**Tuesday, June 18, 2019 4:00PM - 5:30PM —**

**Session L4 MS: Metals Phase Transitions I** Pavilion West - Matt Hudspeth, LANL

**4:00PM L4.00001 Studies on the Mg hcp-bcc phase boundary through shock and release**, MATTHEW T BEASON, ANIRBAN MANDAL, BRIAN J JENSEN, Los Alamos National Laboratory —

**4:15PM L4.00002 Nanosecond freezing of gallium metal under extreme effective cooling rates. Part 1: Experiments**, JUSTIN BROWN, BRIAN STOLTZFUS, Sandia National Laboratories, JONATHAN BELOF, PHILIP MYINT, Lawrence Livermore National Laboratory —

**4:30PM L4.00003 Nanosecond freezing of gallium under extreme effective cooling rates. Part 2: Theory and Simulations<sup>1</sup>**, JONATHAN BELOF, PHILIP MYINT, Lawrence Livermore National Laboratory, JUSTIN BROWN, BRIAN STOLTZFUS, Sandia National Laboratories —

<sup>1</sup>This work is performed under the auspices of the U. S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

**4:45PM L4.00004 Transformation pathways and microstructural evolution in shock-loaded and reshocked Zr and Ti**, BENJAMIN MORROW, DAVID JONES, ELLEN CERRETA, Los Alamos National Laboratory —

**5:00PM L4.00005 An atomistic view of zirconium during shock compression and release**, MARTIN GORMAN, LLNL, CINDY BOLME, LANL, DAVID MCGONEGLE, Oxford University, ARIANNA GLEASON, SLAC, CARL GREEF, LANL, JUNE WICKS, Johns Hopkins University, PATRICK HEIGHWAY, Oxford University, KENNY HULPACH, BENNY GLAM, Princeton University, ERIC GALTIER, HAE JA LEE, SLAC, JON EGGERT, RAYMOND SMITH, LLNL —

**5:15PM L4.00006 Examining the alpha-epsilon phase transition in cerium at high pressures**, BRIAN JENSEN, FRANK CHERNE, NENAD VELISAVLJEVIC, MATTHEW BEASON, DAVID HOLTkamp, THOMAS HARTSFIELD, Los Alamos National Laboratory —

**Tuesday, June 18, 2019 4:00PM - 5:30PM —**

**Session L5 BIEP: Penetration II** Broadway I/II - Cyril Williams, ARL

**4:00PM L5.00001 Size Scaling Damage Saturation in Hypervelocity Cratering Experiments in Al 2024**, JAMES WALKER, SIDNEY CHOCHRON, DONALD GROSCH, Southwest Research Institute —

**4:15PM L5.00002 Rate Dependence of Penetration in Sandy Soils**, STEPHAN BLESS, New York University, MEHDI OMIDVAR, Manhattan College, ABDELAZIZ ADS, MAGUED ISKANDER, New York University, NEW YORK UNIVERSITY COLLABORATION —

**4:30PM L5.00003 Projectile penetration in granular material and high strain rate response of sand<sup>1</sup>**, DAYAKAR PENUMADU, AASHISH SHARMA, University of Tennessee —

<sup>1</sup>Grant/Award HDTRA1-12-1-0045, Program Manager: Dr. Douglas A. Dalton (Allen)

**4:45PM L5.00004 Incipient Fracture of Ceramics Under Ballistic Impact<sup>1</sup>**, BRIAN SCHUSTER, ANDREW TONGE, NICHOLAS LORENZO, Army Research Laboratory —

<sup>1</sup>This publication is based upon work performed at the Dynamic Compression Sector, which is operated by Washington State University under the U.S. Department of Energy (DOE)/National Nuclear Security Administration award no. DE-NA0002442. This research used resources of the Advanced Photon Source, a DOE Office of Science User Facility operated for the DOE Office of Science by Argonne National Laboratory under contract no. DE-AC02-06CH11357.

**5:00PM L5.00005 Impact and Penetration in a Synthetic Cohesive Soil**, MEHDI OMIDVAR, Manhattan College, STEPHAN BLESS, ABDELAZIZ ADS, MAGUED ISKANDER, New York University —

**5:15PM L5.00006 Macro-damage and deformed microstructure of depleted uranium impacted by steel projectile at different velocities<sup>1</sup>**, DONGLI ZOU, DAWU XIAO, YAWEN ZHAO, LIFENG HE, CHAO LU, China Academy of Engineering Physics —

<sup>1</sup>The authors thank for the support of the Science Development Fund of China Academy of Engineering Physics (NO. 2014B0301046) and National Natural Science Foundation (51401187).

**Tuesday, June 18, 2019 4:00PM - 5:30PM —**

**Session L6 TMS: First-principles and Molecular Dynamics V** Broadway III/IV - Thomas Mattsson, Sandia National Labs (SNL)

**4:00PM L6.00001 Calculation of elastic constants at high pressure from first-principles**, SHAILESH MEHTA, Atomic Weapons Establishment —

**4:30PM L6.00002 First-principles calculations of multiple-shock conductivity measurements in hydrogen and deuterium**, MARCUS KNUDSON, MICHAEL DESJARLAIS, Sandia National Laboratories, MARTIN PREISING, RONALD REDMER, Institute of Physics, University of Rostock —

**4:45PM L6.00003 Multiphase equation of state of beryllium**, JOSHUA COE, SVEN RUDIN, BORIS MAIOROV, Los Alamos National Lab —

**5:00PM L6.00004 Predictive simulations of metastable phases of carbon at high compression**, ASHLEY HUFF, KIEN NGUYEN CONG, JONATHAN WILLMAN, University of South Florida, NIR GOLDMAN, Lawrence Livermore National Laboratory, IVAN OLEYNIK, University of South Florida —



**5:15PM L6.00005 Modeling Sensitivity Analysis of the Interface Temperature of Dynamically Compressed Iron<sup>1</sup>**, DAVID BRANTLEY, ERIC SHI, MINTA AKIN, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344 LLNL-ABS-768698.

**Wednesday, June 19, 2019 8:00AM - 9:00AM** —  
Session M1 Plenary Session III Grand Ballroom I/II - Alejandro Strachan, Purdue

**8:00AM M1.00001 Molecular Dynamics Simulation: Engine of Discovery or Bridge to Nowhere?<sup>1</sup>**, AIDAN THOMPSON, Sandia National Laboratories —

<sup>1</sup>Supported by the Laboratory Directed Research and Development program at Sandia National Laboratories, a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC., a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA-0003525.

**Wednesday, June 19, 2019 9:15AM - 10:45AM** —  
Session N1 DSIC: Shock-induced chemical reactions Grand Ballroom I - Dana Dattelbaum, LANL

**9:15AM N1.00001 Examination of Shock-Induced Reaction in Ni/Al Powder Mixture<sup>1</sup>**, ANIRBAN MANDAL, MATTHEW BEASON, BRIAN JENSEN, Shock and Detonation Physics (M-9), Los Alamos National Laboratory, Los Alamos NM 87545 —

<sup>1</sup>Institute for Materials Science, Los Alamos, NM 87545

**9:30AM N1.00002 Hydrodynamic simulations of shock-driven chemistry in polyimide**, JEFFREY PETERSON, JOSHUA COE, Los Alamos National Laboratory —

**9:45AM N1.00003 Spectroscopic Characterization and Burn Rate Measurements of Deflagrating High Explosives**, SUZANNE SHEEHE, SCOTT JACKSON, Los Alamos National Laboratory —

**10:00AM N1.00004 High resolution simulations of shock-induced combustion of Aluminum droplets<sup>1</sup>**, PRATIK DAS, H.S. UDAYKUMAR, University of Iowa —

<sup>1</sup>Air Force Office of Scientific Research under grant numbers FA9550-15-1-0332 (Program Officer: Dr. Martin Schmidt) and SA0000506 (Program Officer: Dr. Fariba Fahroo)

**10:15AM N1.00005 Homogeneous initiation in single crystal PETN from shock induced bulk heating**, BRYAN HENSON, Los Alamos National Laboratory —

**Wednesday, June 19, 2019 9:15AM - 10:45AM** —  
Session N2 TMS: First-principles and Molecular Dynamics VI Grand Ballroom II - Nicolas Pineau, CEA

**9:15AM N2.00001 Diamond Formation from Hydrocarbons in Planetary Conditions: An ab initio Study**, MAITRAYEE GHOSH, Laboratory for Laser Energetics and Department of Chemistry, University of Rochester, S. X. HU, Laboratory for Laser Energetics, University of Rochester —

**9:30AM N2.00002 Critical point, liquid-vapor coexistence, and melting of Mg<sub>2</sub>SiO<sub>4</sub> from ab-initio simulations<sup>1</sup>**, JOSHUA TOWNSEND, High Energy Density Physics Theory, Sandia National Laboratories, Albuquerque, NM 87185, GIL SHOHET, Department of Aeronautics & Astronautics, Stanford University, Stanford, CA 94305, LUKE SHULENBURGER, High Energy Density Physics Theory, Sandia National Laboratories, Albuquerque, NM 87185, MICHAEL DESJARLAIS, Pulsed Power Sciences, Sandia National Laboratories, Albuquerque, NM 87185 —

<sup>1</sup>This work was supported by the Z Fundamental Science Program (ZFSP) at Sandia National Laboratories. Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC., a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

**9:45AM N2.00003 Rapid Compression of Prototype Sand-like Systems using Atomistic Molecular Dynamic Simulations<sup>1</sup>** , SHINYOUNG KANG, DANIEL ORLIKOWSKI, Lawrence Livermore National Laboratory, LAWRENCE LIVERMORE NATIONAL LABORATORY TEAM —

<sup>1</sup>Acknowledgement: This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

**10:00AM N2.00004 Hydrocarbon and water desorption from oxide surfaces using non-reactive and reactive molecular dynamics** , JASON KOSKI, MATTHEW LANE, Sandia National Labs —

**10:15AM N2.00005 Numerical modeling of the phase transition kinetics for the sub-microsecond solidification of water under dynamic compression<sup>1</sup>** , DANE STERBENTZ, University of California, Davis, PHILIP MYINT, Lawrence Livermore National Laboratory, JEAN-PIERRE DELPLANQUE, University of California, Davis, JONATHAN BELOF, Lawrence Livermore National Laboratory —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344. We thank A. Arsenlis, D.P. McNabb, and B. Wallin for funding and project support.

**10:30AM N2.00006 Shock Processes in Water: multi-scale comparison and experimental results** , LONGHAO HUANG, JOHN BORG, Marquette University —

**Wednesday, June 19, 2019 9:15AM - 10:45AM** —  
Session N3 AETD: User facilities Pavilion East - Joe Zaug, LANL

**9:15AM N3.00001 The Laser Shock Station in the Dynamic Compression Sector** , XIAOMING WANG, Washington State University, DOUG BROEGE, JAKE BROMAGE, ROBERT EARLEY, DALE GUY, Laboratory for Laser Energetics, University of Rochester, JAMES HAWRELIAK, YUELIN LI, PAULO RIGG, ADAM SCHUMAN, JOHN SETHIAN, NICHOLAS SINCLAIR, YOSHIMASA TOYODA, NICHOLAS WEIR, BRENDAN WILLIAMS, JUN ZHANG, Washington State University, JON ZUEGEL, Laboratory for Laser Energetics, University of Rochester, Y. M. GUPTA, Washington State University —

**9:30AM N3.00002 The transit to detonation in high explosives** , NEIL BOURNE, DAVID EASTWOOD, SEBASTIAN MARUSSI, University of Manchester, GARY PARKER, PETER DICKSON, Los Alamos National Laboratory, ROBERT ATWOOD, THOMAS CONNELLY, Diamond Light Source Ltd., DOUG WAGSTAFF, ANNA MARTINEZ, Health and Safety Executive, UOMAH COLLABORATION, LANL COLLABORATION, DLS COLLABORATION, HSE COLLABORATION —

**9:45AM N3.00003 Recent Advances at the Dynamic Compression Sector** , P. A. RIGG, Washington State University —

**10:15AM N3.00004 Workflow and visual analysis for XFEL shock physics experiments using Cinema:Bandit** , CYNTHIA BOLME, DANIEL ORBAN, DIVYA BANESH, CAMERON TAUXE, CHRIS BIWER, AYAN BISWAS, RAMON SAAVEDRA, CHRISTINE SWEENEY, RICHARD SANDBERG, JAMES AHRENS, DAVID ROGERS, Los Alamos National Laboratory —

**10:30AM N3.00005 EXAFS measurements of ramp-compressed iron at the National Ignition Facility (NIF)<sup>1</sup>** , F. COPPARI, A. G. KRYGIER, Y. PING, J. M. MCNANEY, G. E. KEMP, D. BRAUN, D. B. THORN, M. MILLOT, P. C. CELLIERS, O. LANDEN, M. B. SCHNEIDER, HYE-SOOK PARK, B. A. REMINGTON, J. H. EGGERT, Lawrence Livermore Natl Lab —

<sup>1</sup>Prepared by LLNL under Contract DE-AC52-07NA27344.

**Wednesday, June 19, 2019 9:15AM - 10:45AM** —  
Session N4 MS: Metals Phase Transitions II Pavilion West - Patricia Kalita, SNL

**9:15AM N4.00001 Phase Transformation of Nitinol Shape Memory Alloy under Dynamic Uniaxial Strain Compression<sup>1</sup>** , JIALONG NING, JOW-LIAN DING, Y.M. GUPTA, Washington State University —

<sup>1</sup>Work Supported by DOE/NNSA

**9:30AM N4.00002 Continuum Modeling of Martensitic Phase Transformation of Nitinol Shape Memory Alloy under Dynamic Loading<sup>1</sup>** , JOW DING, JIALONG NING, YOGENDRA GUPTA, Washington State University —

<sup>1</sup>Work supported by DOE/NNSA

**9:45AM N4.00003 Studying the dynamic phase transitions in tin with impact experiments on pre-heated samples**, ELI GUDINETSKY, Department of Physics, Ben-Gurion University of the Negev, EUGENE ZARETSKY, Department of Mechanical Engineering, Ben-Gurion University of the Negev —

**10:00AM N4.00004 Constitutive modelling of phase transition in iron under sweeping detonation wave loading**, A.D. RESNYANSKY, WCDSD, Defence Science and Technology Group, PO Box 1500, Edinburgh SA 5111, G.T. GRAY III, L.M. HULL, B.J. WARTHEN, Los Alamos National Laboratory, Los Alamos, NM 87545, USA —

**10:15AM N4.00005 Investigation of tantalum room temperature isothermal compression to multi-megabar pressures using two-stage diamond anvils**, KALEB C. BURRAGE, CHRISTOPHER S. PERREAULT, Dept. of Physics, University of Alabama at Birmingham, Birmingham, AL, ERIC MOSS, JEFFREY S. PIGOTT, BLAKE T. STURTEVANT, Shock and Detonation Physics, Los Alamos National Laboratory, Los Alamos, NM, JESSE SMITH, High Pressure Collaborative Access Team, X-ray Science Division, Argonne National Laboratory, Lemont, IL, YOGESH K. VOHRA, Dept. of Physics, University of Alabama at Birmingham, Birmingham, AL, NENAD VELISAVLJEVIC, Shock and Detonation Physics, Los Alamos National Laboratory, Los Alamos, NM —

**10:30AM N4.00006 X-Ray Diffraction of Platinum at High Pressures**, MARY KATE GINNANE, Laboratory for Laser Energetics, University of Rochester, AMY LAZICKI, Lawrence Livermore National Laboratory, DANAE POLSIN, XUCHEN GONG, Laboratory for Laser Energetics, University of Rochester, RICHARD KRAUS, JON EGGERT, DAYNE FRATANDUONO, Lawrence Livermore National Laboratory, CHAD MCCOY, CHRISTOPHER SEAGLE, JEAN-PAUL DAVIS, Sandia National Laboratories, TOM BOEHLY, J. RYAN RYGG, GILBERT COLLINS, Laboratory for Laser Energetics, University of Rochester —

**Wednesday, June 19, 2019 9:15AM - 10:45AM –**  
**Session N5 BIEP: Spall II** Broadway I/II - Justin Wilkerson, TAMU

**9:15AM N5.00001 Spall and re-compaction in OFHC copper under high velocity impact**, M. CAMERON HAWKINS<sup>1</sup>, Mission Support and Test Services, LLC —

<sup>1</sup>M. C. Hawkins<sup>1</sup>, R. S. Hixson<sup>2</sup>, S. Thomas<sup>2</sup>, and S. Fensin<sup>3</sup> <sup>1</sup>Mission Support and Test Services, LLC, LVO <sup>2</sup>Mission Support and Test Services, LLC, NMO <sup>3</sup>Los Alamos National Laboratory

**9:45AM N5.00002 Shock structure and spall behavior of porous aluminum**, ZEV LOVINGER, California Institute of Technology, CHRISTIAN KETTENBEIL, SURAJ RAVINDRAN, GURUSWAMI RAVICHANDRAN, California Institute of Technology, 1200 E. California Blvd., Pasadena, CA 91125, CHRISTOPHE CZARNOTA, ALAIN MOLINARI, Laboratoire d'Etude des Microstructures et de Mécanique des Matériaux, LEM3-UMR CNRS 7239, 7 rue Flix Savart BP 15082 57073 Metz, Cedex 03 France —

**10:00AM N5.00003 Nucleation and Growth of Voids in Shock Loaded Copper Bicrystals<sup>1</sup>**, ELIZABETH FORTIN, BENJAMIN SHAFFER, Arizona State University, SAUL OPIE, General Atomics, MATTHEW CATLETT, Los Alamos National Laboratory, PEDRO PERALTA, Arizona State University —

<sup>1</sup>Funding: DE-NA0002005 and DE-NA0002917

**10:15AM N5.00004 Shock Propagation and Spall Behaviour of Ceramic-doped Polyurea Composites.<sup>1</sup>**, ANDREW ODDY, ANTON LEBAR, RAFAELA AGUIAR, OREN PETEL, Department of Mechanical and Aerospace Engineering, CARLETON UNIVERSITY IMPACT RESEARCH LAB COLLABORATION —

<sup>1</sup>IDEaS Grant

**10:30AM N5.00005 Void growth in ductile materials**, LAURIANNE PILLON, LAURENT SOULARD, CEA, DAM, DIF, F-91297 Arpajon Cedex, France —

**Wednesday, June 19, 2019 9:15AM - 10:45AM –**  
**Session N6 GPS: Earth and planetary materials** Broadway III/IV - Marius Millot, Lawrence Livermore National Laboratory (LLNL)

**9:15AM N6.00001 Shock velocity, sound speed, and Hugoniot temperature in silicate liquids to 100 GPa<sup>1</sup>**, PAUL ASIMOW, JINPING HU, OLIVIA PARDO, Caltech, CHANG SU, Chinese Academy of Sciences, XIAOJUAN MA, Southwest Jiao Tong University —

<sup>1</sup>NSF EAR-1725349

**9:30AM N6.00002 Secondary Hugoniot of MgO**, LINDA CRANDALL, MARGARET HUFF, GREG TABAK, ZAIRE SPROWAL, J. RYAN RYGG, DANAE POLSIN, MOHAMED ZAGHOO, GILBERT COLLINS, Laboratory for Laser Energetics, DAYNE FRATANDUONO, RAY SMITH, JOHN EGGERT, LLNL, DAMIEN HICKS, Swinburne University of Technology —

**9:45AM N6.00003 Direct shock compression of pre-synthesized high-pressure silicates: Implication for internal structure of super-Earth<sup>1</sup>** , YINGWEI FEI, Carnegie Institution for Science

<sup>1</sup>This work is supported by the Z Fundamental Science Program at Sandia National Laboratories and the Carnegie Venture Grant. Collaborators include C.T. Seagle, J. P. Townsend, L. Shulenburg, M. Furnish from SNL, and A. Boujibar, P. Driscoll from Carnegie. SNL is managed and operated by NTESS under DOE NNSA contract DE-NA0003525

**10:15AM N6.00004 Sound Velocities in Shock-Synthesized Stishovite to 72 GPa<sup>1</sup>** , ELEANOR J. BERRYMAN, Princeton University, J. MICHAEL WINEY, YOGENDRA M. GUPTA, Washington State University, THOMAS S. DUFFY, Princeton University —

<sup>1</sup>Work supported by DOE/NNSA.

**10:30AM N6.00005 Shockless compression of hydrated silicate glasses<sup>1</sup>** , JEAN-PAUL DAVIS, Sandia National Labs , ALISHA N. CLARK, STEVEN D. JACOBSEN, Northwestern University, J. MATTHEW LANE, KYLE R. COCHRANE, JOSHUA P. TOWNSEND, Sandia National Labs, ADAM R. SARAFIAN, Corning, Inc. —

<sup>1</sup>Sandia National Labs is managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a subsidiary of Honeywell International, Inc., for the U.S. DOE NNSA under contract DE-NA0003525.

**Wednesday, June 19, 2019 11:00AM - 12:30PM —**

**Session O1 DSIC: Flyer Plates and Low Performance Explosives** Grand Ballroom I - Alexander S. Tappan, SNL

**11:00AM O1.00001 Comparing the shock sensitivity of RDX particles using laser-driven flyer plate impacts** , STEVEN DEAN, FRANK DE LUCIA, JR., JENNIFER GOTTFRIED, US Army Research Laboratory

**11:15AM O1.00002 Hot Spot Chemistry in Several Polymer-bound Explosives under Nanosecond Shock Conditions** , WILL BASSETT, Lawrence Livermore Natl Lab, BELINDA JOHNSON, University of Illinois at Urbana Champaign, HARRY SPRINGER, Lawrence Livermore Natl Lab, DANA DLOTT, University of Illinois at Urbana Champaign —

**11:30AM O1.00003 Imaging the Reactive Flow Structure Evolution in Shocked Nitromethane and Nitromethane with Additives** , ERIN NISSEN, MITHUN BHOWMICK, DANA DLOTT, University of Illinois at Urbana-Champaign —

**11:45AM O1.00004 Development of Low-Density Explosive Formulations Based on Ammonium Picrate with Slow Detonation Velocities** , BRYCE TAPPAN, JOHN BUDZINSKI, ERIC MAS, LARRY HULL, LARRY HILL, PATRICK BOWDEN, JOSEPH LICHTHARDT, ANDREW SCHMALZER, MARVIN SHORTY, PHILIP MILLER, DANIEL MCDONALD, MICHAEL BURKETT, Los Alamos National Laboratory —

**12:00PM O1.00005 ABSTRACT WITHDRAWN —**

**12:15PM O1.00006 Characterization of PBX 9502 Dead Zones via Spectrally Encoded Imaging** , TERRY SALYER, Los Alamos National Laboratory —

**Wednesday, June 19, 2019 11:00AM - 12:30PM —**

**Session O2 TMS: First-principles and Molecular Dynamics VII** Grand Ballroom II - Mark Elert, US Naval Academy

**11:00AM O2.00001 Time dependent boundary conditions for large scale atomistic simulations of Richtmyer-Meshkov instabilities<sup>1</sup>** , J.E. HAMMERBERG, R. RAVELO, T.C. GERMANN, Los Alamos National Laboratory —

<sup>1</sup>This work was supported by the US Department of Energy through the Los Alamos National Laboratory. Los Alamos National Laboratory is operated by Triad National Security, LLC, for the National Nuclear Security Administration of U.S. Department of Energy (Contract No. 89233218CNA000001). This work was funded by the LANL LDRD ER program, grant 20180721ER, whose support is gratefully acknowledged.

**11:15AM O2.00002 Validation and Calibration of Metal Strength Models Using Richtmyer-Meshkov Instability Measurements and Simulations<sup>1</sup>**, CHRISTOPHER GARASI, JOSEPH OLLES, RYAN COLEMAN, Sandia National Laboratories —

<sup>1</sup>Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia LLC, a wholly owned subsidiary of Honeywell International Inc. for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525

**11:30AM O2.00003 Semi-analytic treatment of the Rayleigh-Taylor instability in a material with strength**, PHILIP D POWELL, THOMAS LOCKARD, KARNIG MIKAELIAN, DAMIAN SWIFT, Lawrence Livermore Natl Lab —

**11:45AM O2.00004 Full multiphase description of materials: application on tin.**, GREGORY ROBERT, LAURIANNE PILLON, GABRIEL SEISSON, CEA, DAM, DIF, F-91297 Arpajon, France, CAMILLE CHAUVIN, CEA, DAM, CEG, F-46500 Gramat, France —

**12:00PM O2.00005 Observation of phase transitions in shocked Tin by molecular dynamics**, LAURENT SOULARD<sup>1</sup>, CEA-DAM Ile-de-France —

<sup>1</sup>Other authors Olivier Durand, CEA-DAM Ile-de-France, olivier.durand@cea.fr Raphael Prat, CEA-DAM Ile-de-France, raphael.prat@cea.fr

**Wednesday, June 19, 2019 11:00AM - 12:30PM —**  
**Session O3 AETD: Loading Techniques** Pavilion East - Eric Brown, LANL

**11:00AM O3.00001 Investigating off-Hugoniot states using multi-layer ring-up targets**, DAVID MCGONEGLE, PATRICK HEIGHWAY, MARCIN SLIWA, JUSTIN WARK, University of Oxford, UK, CYNTHIA BOLME, LANL, ANDREW COMLEY, AWE, UK, LEORA COOPER, MIT, ANDREW HIGGINBOTHAM, ASHLEY POOLE, University of York, UK, EMMA MCBRIDE, BOB NAGLER, INHYUK NAM, MATT SEABERG, SLAC National Accelerator Laboratory, BRUCE REMINGTON, ROBERT RUDD, CHRISTOPHER WEHRENBURG, LLNL —

**11:15AM O3.00002 Shockwave Compression of Pre-Compressed H<sub>2</sub>-He Mixtures<sup>1</sup>**, SAKUN DUWAL, CHRISTOPHER SEAGLE, MARCUS KNUDSON, Sandia National Laboratories —

<sup>1</sup>Sandia National Labs is managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a subsidiary of Honeywell International, Inc., for the U.S Dept. of Energy's National Nuclear Security Administration under contract DE-NA0003525.

**11:30AM O3.00003 Testing the performance of a novel plane wave generator with a low explosive mass using a many channel PDV system.**, JAMES RICHLEY, Atomic Weapons Establishment —

**11:45AM O3.00004 Dynamic tensile response of an alumina ceramic under 1D-stress state**, JEAN-LUC ZINSZNER, BENJAMIN ERZAR, CEA Gramat, CEA GRAMAT TEAM —

**12:00PM O3.00005 Dynamic Fragmentation of Impulsively Loaded Rings at Varying Strain Rates<sup>1</sup>**, BILL REINHART, SCOTT ALEXANDER, Sandia National Laboratories —

<sup>1</sup>SNL is managed and operated by NTESS under DOE NNSA contract DE-NA0003525

**12:15PM O3.00006 Measuring strength of materials at very high strain rates using electromagnetically driven expanding cylinders**, EYAL AVRIEL, ZEV LOVINGER, Rafael Advanced Defense Systems, Haifa, 31021, Israel, RONI NEMIROVSKY, Technion Solid State Institute and Physics Department, Technion, Haifa, 32000, Israel, DANIEL RITTEL, Technion Faculty of Mechanical Engineering, Technion, Haifa, 32000, Israel —

**Wednesday, June 19, 2019 11:00AM - 12:30PM —**  
**Session O4 MS: Process and Structure Effects on Dynamic Response** Pavilion West - Brittany Branch, SNL

**11:00AM O4.00001 Laser welding and powder bed fusion of uranium-6 wt. pct. niobium<sup>1</sup>**, AMANDA WU, Lawrence Livermore National Laboratory —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

**11:30AM O4.00002 Anelastic Effects on Reverse Loading – Connection to Evolving Dislocation Structure<sup>1</sup>** , NATHAN BARTON, RYAN AUSTIN, Lawrence Livermore Natl Lab, JUSTIN BROWN, Sandia National Laboratories, MOONO RHEE, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344 (LLNL-ABS-767824).

**11:45AM O4.00003 Effects of manufacturing processes on the dynamic properties of gold.<sup>1</sup>** , WILLIAM ANDERSON, ANIRBAN MANDAL, DANIEL HOOKS, BRIAN JENSEN, Los Alamos National Laboratory —

<sup>1</sup>Work supported by U.S. Department of Energy

**12:00PM O4.00004 ABSTRACT WITHDRAWN —**

**12:15PM O4.00005 Dynamic deformation of additively manufactured lattice structures<sup>1</sup>** , MUKUL KUMAR, JONATHAN LIND, ANDREW ROBINSON, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344. This publication is based in part upon work performed at the Dynamic Compression Sector at the Advanced Photon Source supported by the Department of Energy, National Nuclear Security Administration, under Award Number DE-NA0002442. This research used resources of the Advanced Photon Source, a U.S. Department of Energy (DOE) Office of Science User Facility operated for the DOE Office of Science by Argonne National Laboratory under Contract No. DE-AC02-06CH11357.

**Wednesday, June 19, 2019 11:00AM - 12:30PM —**  
**Session O5 BIEP: Ejecta IV** Broadway I/II - Alison Saunders, LLNL

**11:00AM O5.00001 Ejecta particle breakup modelling** , ROBIN WILLIAMS, CHRIS BATHA, Atomic Weapons Establishment —

**11:15AM O5.00002 The Spike Dynamics Source Model for Ejecta in the FLAG Code<sup>1</sup>** , ALAN HARRISON, Los Alamos National Laboratory —

<sup>1</sup>This work was performed under the auspices of the United States Department of Energy. The financial support for this work is provided by the Advanced Simulation and Computing (ASC) program.

**11:30AM O5.00003 High-Order Lagrangian Hydrodynamics Computations of Surface Perturbations in Shock-Driven Metal<sup>1</sup>** , FADY NAJJAR, LEO KIRSCH, ROB RIEBEN, Lawrence Livermore Natl Lab, LAWRENCE LIVERMORE NATL LAB TEAM —

<sup>1</sup>LLNL-ABS-767743. This work was performed under the auspices of the U.S. Department of Energy by LLNL under contract DE-AC52-07NA27344.

**11:45AM O5.00004 Development and validation of a compressible nonlinear growth spike velocity model** , JONATHAN D. REGELE, ALAN K. HARRISON, MARIANNE M. FRANCOIS, Los Alamos National Laboratory —

**12:00PM O5.00005 Influence of the phase transitions of tin on microjetting and ejecta production** , OLIVIER DURAND, LAURENT SOULARD, RAPHAL PRAT, LAURENT COLOMBET, CEA de Bruyeres-le-Chatel —

**12:15PM O5.00006 Modeling reactive conversion of Ce ejecta in H<sub>2</sub> and D<sub>2</sub> gases<sup>1</sup>** , J.D. SCHWARZKOPF, D.G. SHEPPARD, J.E. HAMMERBERG, M.M. SCHAUER, W.T. BUTTLER, R.K. SCHULZE, Los Alamos National Laboratory —

<sup>1</sup>This work was supported by the US Department of Energy through the Los Alamos National Laboratory. Los Alamos National Laboratory is operated by Triad National Security, LLC, for the National Nuclear Security Administration of U.S. Department of Energy (Contract No. 89233218CNA000001). This work was funded by the LANL LDRD DR program, grant 20170082DR, whose support is gratefully acknowledged.

**Wednesday, June 19, 2019 11:00AM - 12:15PM —**  
**Session O6 GPS: Improving equations of state and models** Broadway III/IV - June Wicks, Johns Hopkins University

**11:00AM O6.00001 Physics of matter at extreme conditions: insights from quantum mechanical calculations<sup>1</sup>** , SHUAI ZHANG, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was in part performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract No. DE-AC52-07NA27344.

**11:30AM O6.00002 Iron Equation of State Measurements on the Z-Machine** , SEAN GRANT, University of Texas System, TOMMY AO, Sandia National Laboratories, AARON BERNSTEIN, University of Texas System, JEAN-PAUL DAVIS, Sandia National Laboratories, TODD DITMIRE, JUNG-FU LIN, University of Texas System, ANDREW PORWITZKY, CHRISTOPHER SEAGLE, Sandia National Laboratories —

**11:45AM O6.00003 Global equation of state of a reactive, polyatomic system: application to carbon dioxide<sup>1</sup>** , PHILIP C. MYINT, CHRISTINE J. WU, DAVID A. YOUNG, PHILIP A. STERNE, Lawrence Livermore National Laboratory —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

**12:00PM O6.00004 Dynamic Properties of Dragonshield BC<sup>TM</sup>, Polyurea 650, and Polyurea 250/1000** , LAUREN EDGERTON, SUSAN BARTYCZAK, WILLIS MOCK, Naval Surface Warfare Center Dahlgren Division, JEFFRY FEDDERLY, EDWARD BALIZER, Naval Surface Warfare Center Carderock Division —

**Thursday, June 20, 2019 8:00AM - 9:00AM —**  
Session Q1 Plenary Session IV Grand Ballroom I/II - Eric Brown, LANL

**8:00AM Q1.00001 Thermal Decomposition to Detonation: Understanding Reaction Violence** , LAURA SMILOWITZ, Los Alamos National Laboratory —

**Thursday, June 20, 2019 9:15AM - 10:45AM —**  
Session R1 DSIC: EOS, Sub-Detonation Response, Multi-shock: Experiments 1 Grand Ballroom I - Steve Todd, SNL

**9:15AM R1.00001 Laser-driven shock-compressed Hugoniot of TATB up to 100 GPa** , A. FERNANDEZ PANELLA, Lawrence Livermore Natl Lab, M. C. MARSHALL, T. MYERS, S. BASTEVA, L. FRIED, D. ERSKINE, T. BUNT, Lawrence Livermore Natl Lab, Livermore, CA, L. LAUDERBACK, J. H. EGGERT, L. D. LEININGER, Lawrence Livermore Natl Lab, LAWRENCE LIVERMORE NAT. LAB TEAM —

**9:30AM R1.00002 Shock Wave Response of an Insensitive High Explosive: Wave Profiles and Continuum Model for FOX-7 Single Crystals<sup>1</sup>** , J. M. WINEY, Y. TOYODA, Y. M. GUPTA, Washington State University —

<sup>1</sup>Work supported by ONR and DOE/NNSA

**9:45AM R1.00003 Measurements of subdetonative shock interactions in PBX-9502** , PHILLIP MILLER, LARRY HULL, ERIC MAS, Los Alamos National Laboratory —

**10:00AM R1.00004 Plate-Impact Experiments on the HMX-based Explosive PBX 9404** , FORREST SVINGALA, RICHARD GUSTAVSEN, JUSTIN JONES, ANDREW HOULTON, Los Alamos National Laboratory —

**10:15AM R1.00005 Investigation of Corner Turning Behaviour in a 95% TATB Based Explosive.** , BEN SUTTON, NICHOLAS WHITWORTH, DAN THOMAS, Atomic Weapons Establishment —

**10:30AM R1.00006 Overdriven-detonation states produced by spherically diverging waves** , MATTHEW BISS, MARK LIEBER, MICHAEL MARTINEZ, Los Alamos National Laboratory —

**Thursday, June 20, 2019 9:15AM - 10:45AM —**  
Session R2 TMS: Mesoscale Simulation Grand Ballroom II - Cole Yarrington, SNL

**9:15AM R2.00001 A hybrid mesoscale-continuum method to model laser shock loading and spall failure at the mesoscales** , SERGEY GALITSKIY, AVINASH DONGARE, University of Connecticut —

**9:30AM R2.00002 Simulated diffraction of laser compressed textured polycrystals from Crystal Plasticity FEM.** , PHILIP AVRAAM, JOHN FOSTER, EMMA FLOYD, ANDY COMLEY, STEVE ROTHMAN, SIMON CASE, JAMES TURNER, AWE plc —

**9:45AM R2.00003 3D Micromechanical Simulation of PBX Composites<sup>1</sup>** , DAVID WALTERS, DARBY LUSCHER, JOHN YEAGER, Los Alamos National Laboratory —

<sup>1</sup>Funded by U.S. Department of Energy - Joint Munitions Program

**10:00AM R2.00004 Analysis of Plate Impact and Hopkinson Bar Experiments for RDX Single-Crystals** , FRANCIS ADDESSIO, DARBY LUSCHER, NISHA MOHAN, MARC CAWKWELL, BEN MORROW, Los Alamos National Laboratory, CHRIS MEREDITH, US Army Research Laboratory, KYLE RAMOS, Los Alamos National Laboratory —

**10:15AM R2.00005 An anisotropic thermodynamically consistent elastoviscoplastic model of HMX under quasi-isentropic compression.<sup>1</sup>** , XINJIE WANG, YANQING WU, FENGLI HUANG, WEIJIA HU, Beijing Institute of Technology —

<sup>1</sup>The authors would like to thank China Postdoctoral Science Foundation (2018M631363) and National Natural Science Foundation of China (No. 11802024) for supporting this project.

**10:30AM R2.00006 Connecting ordered meso-structures with the system's dynamic response under complex dynamic loading<sup>1</sup>** , JOHN BORG, ALEX DAWSON, DINC ERDENIZ, JOHN MOORE, SOMESH ROY, SIMCHA SINGER, RON COUTU, Marquette University —

<sup>1</sup>This work made possible with support from AFOSR FA9550-18-1-0435 under the direction of Martin Schmidt

**Thursday, June 20, 2019 9:15AM - 10:45AM —**  
Session R3 AETD: Temperature Diagnostics Pavilion East - Tommy Ao, SNL

**9:15AM R3.00001 An alternative method for high-precision calibration for dynamic pyrometry measurements above 2500 K** , ERIC DUTRA, Nevada National Security Site, MINTA AKIN, RYAN CRUM, Lawrence Livermore National Laboratory, HEMANG MEHTA, University of California, Irvine, YEKATERINA OPACHICH, ERIC SHI, Lawrence Livermore National Laboratory —

**9:30AM R3.00002 Tracking Temperatures and Growth of Hot Spots in a Simplified Plastic-Bonded Explosive Under Shock Compression** , BELINDA P. JOHNSON, DANA D. DLOTT, University of Illinois at Urbana-Champaign —

**9:45AM R3.00003 Measurement of Temperature and Water Vapor Concentration Using Laser Absorption Spectroscopy in Kilogram-Scale Explosive Fireballs** , MICHAEL SOO, ADAM SIMS, JAY CEROW, JAMES LIGHTSTONE, Naval Surface Warfare Center Indian Head EOD Technology Division, CHRISTOPHER MURZYN, NICK GLUMAC, University of Illinois at Urbana-Champaign, Mechanical Science and Engineering, JAMES OTT, MICHAEL DEMAGISTRIS, NEERAJ SINHA, Combustion Research and Flow Technology, Inc. —

**10:00AM R3.00004 Optical thermocouples for explosive fireballs.<sup>1</sup>** , HERGEN EILERS, BENJAMIN ANDERSON, NATALIE GESE, RAY GUNAWIDJAJA, MICHAEL MARK, Washington State University —

<sup>1</sup>This work was supported by the Defense Threat Reduction Agency, Award HDTRA1-15-1-0044 to Washington State University

**10:15AM R3.00005 Time-resolved Sensing of Shock Pressure Distributions Using OPTO-Mechanical Multi-layer Photonic Crystal Structures<sup>1</sup>** , NARESH THADHANI, DAVID SCRIPKA, ANDREW BODDORFF, GREG KENNEDY, Georgia Institute of Technology —

<sup>1</sup>This project is supported by DTRA grantHDTRA1-18-1-0004

**10:30AM R3.00006 Optical Measurement of Shock Demagnetization in Single Crystal Yttrium Iron Garnet** , BRIAN WILMER, SURVICE Engineering Company, STEVEN DEAN, JENNIFER GOTTFRIED, WILLARD UHLIG, JAMES CAZAMIAS, U.S. Army Research Laboratory —

**Thursday, June 20, 2019 9:15AM - 10:45AM —**  
Session R4 MS: Phase Transitions | Pavilion West - Amanda Wu, LLNL



**9:15AM R4.00001 Chemical Synthesis Under Extreme Pressures: Novel Condensed Matter Binary Compounds Containing Bismuth** , JAMES WALSH, Northwestern University, SAMANTHA CLARKE, Lawrence Livermore National Laboratory, KELLY POWDERLY, Princeton University, ALEXANDRA TAMERIUS, Northwestern University, YUE MENG, Argonne National Laboratory, STEVEN JACOBSEN, DANNA FREEDMAN, Northwestern University —

**9:30AM R4.00002 Structural Transformations during Shock Compression/Release of Germanium<sup>1</sup>** , PRITHA RENGANATHAN, S. J. TURNEAURE, S. M. SHARMA, Y. M. GUPTA, Washington State University —

<sup>1</sup>Work supported by DOE/NNSA

**9:45AM R4.00003 In situ X-ray diffraction study of high-pressure phase transition in zinc oxide under shock loading** , SALLY JUNE TRACY, Carnegie Institution for Science, STEFAN TURNEAURE, Washington State University, THOMAS DUFFY, Princeton University —

**10:00AM R4.00004 Solid-solid, melting, and solidification phase transitions in shock-compressed silicon<sup>1</sup>** , STEFAN TURNEAURE, SURINDER SHARMA, YOGENDRA GUPTA, Washington State University —

<sup>1</sup>Work supported by DOE/NNSA.

**10:15AM R4.00005 Shock response of nanodiamonds explored by dynamic x-ray diffraction shock compression.<sup>1</sup>** , TIMOTHY JENKINS, GERRIT SUTHERLAND, NICHOLAS LORENZO, ERIC JOHNSON, US Army Rsch Lab - Aberdeen —

<sup>1</sup>Work was performed at the Dynamic Compression Sector under DOE/NNSA award no. DE-NA0002442 and the Advanced Photon Source, DOE contract no. DE-AC02-06CH11357.

**10:30AM R4.00006 Shock Compression of Graphite: Role of Orientational Order on the Graphite to Diamond Transformation<sup>1</sup>** , TRAVIS VOLZ, Y. M. GUPTA, Washington State University —

<sup>1</sup>Work supported by DOE/NNSA

**Thursday, June 20, 2019 9:15AM - 10:45AM —**  
Session R5 PPCM: Porous Rocks Broadway I/II - D. Anthony Fredenburg, LANL

**9:15AM R5.00001 Characterization and Modeling of Compaction Damage from Shaped Charge Jet Penetration in Saturated Geomaterials** , ANDREW SEAGRAVES, Schlumberger —

**9:45AM R5.00002 Shock Compaction of Cortuf – an Ultra High Performance Concrete** , CHRISTOPHER NEEL, Air Force Research Laboratory —

**10:00AM R5.00003 Uniaxial Wave Propagation Through Copper Mountain Sandstone<sup>1</sup>** , NATHANIEL HELMINIAK, JOHN BORG, Marquette University —

<sup>1</sup>Defense Threat Reduction Agency - HDTRA1-15-1-0073 [01430-72296]

**10:15AM R5.00004 Finite element analyses of a granular assembly under projectile loading incorporating computed tomography imaging and damage mechanics<sup>1</sup>** , ANNE TURNER, AASHISH SHARMA, DAYAKAR PENUMADU, University of Tennessee, ERIC HERBOLD, Lawrence Livermore National Lab —

<sup>1</sup>We would like to acknowledge DTRA support from Defense Threat Reduction Agency (DTRA) Grant HDTRA1-12- 10045, managed by Dr. Douglas A. Dalton (Allen).

**10:30AM R5.00005 The effect of grain-scale properties on ballistic penetration into sand** , JAMES PERRY, CHRIS BRAITHWAITE, NICK TAYLOR, ANDREW JARDINE, University of Cambridge —

**Thursday, June 20, 2019 9:15AM - 10:45AM —**  
Session R6 GPS: Geophysics and Planetary Science Broadway III/IV - Dylan Spaulding, UC Davis

**9:15AM R6.00001 Quasi-isentropic sound velocity measurements of deuterium-helium mixtures at planetary interiors conditions in reverberating shocks experiments** , ZHI-GUO LI, Institute of Fluid Physics, CAEP, QI-FENG CHEN, YUN-JUN GU, JUN ZHENG, CHENG-JUN LI, National Key Laboratory of Shock Wave and Detonation Physics, Institute of Fluid Physics, CAEP —

**9:30AM R6.00002 Optical properties of warm dense fluid helium at jovian planet interior conditions** , MARIUS MILLOT, Lawrence Livermore National Laboratory, STEPHANIE BRYGOO, PAUL LOUBEYRE, CEA, PETER CELLIERS, Lawrence Livermore National Laboratory, GILBERT COLLINS, University of Rochester, JON EGGERT, Lawrence Livermore National Laboratory, RYAN RYGG, University of Rochester, DAMIAN SWIFT, RAYMOND JEANLOZ, Lawrence Livermore National Laboratory —

**9:45AM R6.00003 Fast deformation of shocked quartz and implications for planar deformation features observed in shocked quartz.** , TOSHIMORI SEKINE, HPSTAR, TOMOKO SATO, Hiroshima Univ., NORIMASA OZAKI, KOHEI MIYANISHI, RYOSUKE KODAMA, Osaka Univ., YUSUKE SETO, Kobe Univ., YOSHINORI TANGE, JASRI, SUBODH TIWAN, AIICHIRO NAKANO, PRIYA VASHISHTA, Univ. South California —

**10:00AM R6.00004 Precompressed Hugoniot of Hydrogen-Helium Mixtures from Density Functional Theory<sup>1</sup>** , RAYMOND CLAY, Sandia National Laboratories —

<sup>1</sup>Sandia National Laboratories is managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

**10:15AM R6.00005 Dynamic Strength Measurements of Meteorites<sup>1</sup>** , DAWN GRANINGER, Lawrence Livermore Natl Lab, BENJAMIN BRUGMAN, Michigan State University, LAURA RIORDAN-CHEN, European Molecular Biology Laboratory, ERIC B. HERBOLD, Lawrence Livermore Natl Lab, SUSANNAH M. DORFMAN, Michigan State University, DAMIAN SWIFT, MEGAN SYAL, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344. LLNL-ABS-768539

**10:30AM R6.00006 Traces of Hiroshima: a forensic investigation of shocked recovered samples** , CAMELIA VERONICA STAN, Lawrence Livermore National Laboratory, HANS-RUDOLF WENK, University of California, Berkeley, NOBUMICHI TAMURA, Lawrence Berkeley National Laboratory —

**Thursday, June 20, 2019 11:00AM - 12:30PM —**  
Session S1 DSIC: Detonation Soot Grand Ballroom I - Robert Reeves, LLNL

**11:00AM S1.00001 Characterization of Detonation and Partial Detonation of PBX 9501, PBX 9502, and TATB** , CHRISTOPHER FREYE, PATRICK BOWDEN, HIRO TESHIMA, DEVIN CARDON, ELIZABETH FRANCOIS, C.J. ROSALES, Los Alamos National Laboratory —

**11:15AM S1.00002 The Velocity of Detonation and Reaction Zone Profile in PBX 9502 as a Function of Initial Density** , CHRISTOPHER ARMSTRONG, PHILIP RAE, Los Alamos National Laboratory —

**11:30AM S1.00003 Frontiers in Experimental Observations of Detonation Properties with X-rays<sup>1</sup>** , TREVOR WILLEY, Lawrence Livermore National Laboratory —

<sup>1</sup>Prepared by LLNL under Contract DE-AC52-07NA27344. LLNL-ABS-768202

**12:00PM S1.00004 Insights into organic chemistry at extreme conditions through evaluation of recovered carbon products produced by detonations** , MILLICENT FIRESTONE, SOKHNA DIOUF, JOHN BOWLAN, Los Alamos National Laboratory, SOENKE SIEFERT, Argonne National Laboratory —

**12:15PM S1.00005 Microscopic and Spectroscopic Analysis of Recovered Detonation Soots<sup>1</sup>** , MICHAEL NIELSEN, MICHAEL BAGGE-HANSEN, JOSHUA HAMMONS, LISA LAUDERBACH, Lawrence Livermore National Laboratory, SHAUL ALONI, Molecular Foundry, Lawrence Berkeley National Laboratory, SORIN BASTEA, LARRY FRIED, JONATHAN LEE, TONY VAN BUUREN, TREVOR WILLEY, Lawrence Livermore National Laboratory —

<sup>1</sup>Prepared by LLNL under Contract DE-AC52-07NA27344. LLNL-ABS-768421

**Thursday, June 20, 2019 11:00AM - 12:30PM —**  
Session S2 TMS: Mesoscale Explosive Initiation I Grand Ballroom II - Keo Springer, LLNL

**11:00AM S2.00001 Reaction rate model of energy release in shocked RDX<sup>1</sup>** , IGOR SCHWEIGERT, United States Naval Research Laboratory —

<sup>1</sup>This work was supported by the Office of Naval Research, both directly (project N0001416WX0003, Dr. Chad Stoltz) and through the U.S. Naval Research Laboratory.

**11:15AM S2.00002 Molecular Dynamics-informed RDX chemistry model and continuum static hot spot simulations<sup>1</sup>** , MICHAEL SAKANO, AHMED HAMED, Purdue University, ED KOBER, Los Alamos National Laboratory, BRENDEN HAMILTON, MD MAHBUBUL ISLAM, MARISOL KOSLOWSKI, ALEJANDRO STRACHAN, Purdue University —

<sup>1</sup>This work was support by the US Office of Naval Research, 743 Multidisciplinary University Research Initiatives (MURI) 744 Program, Contract: N00014-16-1-2557. Program managers: 745 Chad Stoltz and Kenny Lipkowitz.

**11:30AM S2.00003 Multi-scale Modelling of Shock Sensitivity in Energetic Materials** , MITCHELL WOOD, Sandia National Laboratories —

**12:00PM S2.00004 Atomistic simulations for granular explosives under shock compression<sup>1</sup>** , NICOLAS PINEAU, XAVIER BIDAULT, CEA/DAM/DIF —

<sup>1</sup>ANR ASTRID fundings (project ATOLE ANR-14- ASTR-0012-02)

**12:15PM S2.00005 Molecular dynamics study of shock loading followed by  $\alpha$ -RDX in (100)-oriented** , ANDREY PEREVERZEV, University of Missouri, NITHIN MATHEW, E.M. KOBER, Los Alamos National Laboratory, TOMMY SEWELL, University of Missouri —

**Thursday, June 20, 2019 11:00AM - 12:30PM —**

**Session S3 AETD: Radiography and Tomography 1** Pavilion East - Kyle Ramos, LANL

**11:00AM S3.00001 Reduction of radiographic spot size with dual diameter sub-mm rods** , AMANDA GEHRING<sup>1</sup>, TODD HAINES, Los Alamos National Laboratory, KEVIN JOYCE, AARON LUTTMAN, Mission Support and Test Services, LLC, A. STEPHEN RICHARDSON, JACOB ZIER, Naval Research Laboratory —

<sup>1</sup>I would prefer an oral presentation; if not selected, I can present a poster.

**11:15AM S3.00002 Measurement of Spherically Converging Shock Waves on OMEGA** , JOHN RUBY, J. RYAN RYGG, GILBERT COLLINS, CHAD FORREST, VLADMIR GLEBOV, Laboratory for Laser Energetics, BENJAMIN BACHMANN, YUAN PING, Lawrence Livermore National Laboratory, HONG SIO, NEEL KABADI, Massachusetts Institute of Technology —

**11:30AM S3.00003 Ultra-high-speed X-ray imaging of shock-induced cavity collapse in a solid medium** , E M ESCAURIZA, D J CHAPMAN, Department of Engineering Science, University of Oxford, J P DUARTE, Institute of Shock Physics, Imperial College London, J C JONSSON, L FARBANIEC, M E RUTHERFORD , L C SMITH, Department of Engineering Science, University of Oxford, M P OLBINADO, A RACK, ESRF, D E EAKINS, Department of Engineering Science, University of Oxford —

**11:45AM S3.00004 Advances on mode I fracture testing in brittle and quasi-brittle materials with x-ray tomography** , ANTOINE CORNET, DAVID EASTWOOD, NEIL BOURNE, PAUL MUMMERY, University of Manchester, CARL CADY, Los Alamos National Laboratory, CHRISTOPH RAU, Diamond Light Source —

**12:00PM S3.00005 In-situ areal density measurement of the fragmentation of laser shock-melted metal using x-ray backlighting** , DONGBING LIU, JINMING CHENG, LIN ZHANG, YINGHUA LI, QINGGUO YANG, BOZHONG TAN, YAN YE, QIXIAN PENG, Institute of Fluid Physics, China Academy of Engineering Physics —

**12:15PM S3.00006 Density Measurements of High Explosives Determined using Non-destructive X-ray Computed Tomography.<sup>1</sup>** , MICHELLE ESPY, NICHOLAS STULL, LARRY HILL, CORT GAUTIER, JAMES HUNTER, SHELDON LARSON, BARTON OLINGER, DARLA THOMPSON, Los Alamos National Laboratory, ALEJANDRO FIGUEROA, Los Alamos National Laboratory; Purdue University —

<sup>1</sup>U.S. Department of Energy

**Thursday, June 20, 2019 11:00AM - 12:30PM —**

**Session S4 MS: Phase Transitions II** Pavilion West - Stefan Turneaure, WSU

**11:00AM S4.00001 ABSTRACT WITHDRAWN —**

**11:15AM S4.00002 Amorphization of covalently bonded solids under dynamic compression<sup>1</sup>**, SHITENG ZHAO, UC Berkeley, ERIC HAHN, Los Alamos National Laboratory, CHRISTOPHER WEHRENBURG, HYE-SOOK PARK, BRUCE REMINGTON, Lawrence Livermore National Laboratory, MARC MEYERS, UC SAN DIEGO —

<sup>1</sup>This research is funded by a UC Research Laboratories Grant (09-LR-06-118456-MEYM) and a National Laser Users Facility (NLUF) Grant (PE-FG52-09NA-29043) and was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

**11:30AM S4.00003 First-principles molecular dynamics simulations of high-pressure phase diagram of carbon**, KIEN NGUYEN CONG, JONATHAN WILLMAN, ASHLEY WILLIAMS, University of South Florida, ANATOLY BELONOSHKO, Royal Institute of Technology, IVAN OLEYNIK, University of South Florida —

**11:45AM S4.00004 High-Pressure Shock Response and Phase Transition of Soda-Lime Glass**, JOSHUA E. GORFAIN, Applied Physical Sciences (United States), C. SCOTT ALEXANDER, Sandia National Laboratories (United States), CHRISTOPHER T. KEY, Applied Physical Sciences (United States) —

**12:00PM S4.00005 Scale and rate dependence of phase transition pressure in CdS nanoparticles**, J. MATTHEW D. LANE, JASON P. KOSKI, AIDAN P. THOMPSON, ISHAN SRIVASTAVA, GARY S. GREST, TOMMY AO, BRIAN S. STOLTZFUS, KEVIN N. AUSTIN, HONGYOU FAN, MARCUS D. KNUDSON, Sandia National Laboratories, DANE MORGAN, MSTs —

**12:15PM S4.00006 Phase transition behavior of silicon nitride under shock loading and unloading process**, NOBUAKI KAWAI, Kumamoto University —

**Thursday, June 20, 2019 11:00AM - 12:30PM —**

**Session S5 PPCM: New Techniques for Porous Materials** Broadway I/II - Dayakar Penumadu, University of Tennessee

**11:00AM S5.00001 Perturbation Decay Experiments on Granular Materials<sup>1</sup>**, TRACY VOGLER, MARCIA COOPER, Sandia National Laboratories —

<sup>1</sup>Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia LLC, a wholly owned subsidiary of Honeywell International Inc. for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

**11:15AM S5.00002 The effect of constitutive behavior in non-planar compaction response of distended media**, MATTHEW HUDSPETH, Los Alamos National Laboratory —

**11:30AM S5.00003 ABSTRACT WITHDRAWN —**

**11:45AM S5.00004 Fast X-ray radiography to study the dynamic compaction mechanisms in a rigid polyurethane foam under plate impact**, PIERRE PRADEL, FREDERIC MALAISE, CEA CESTA, France, THIBAUT DE RESSEGUIER, Institut Pprime, France, MARGIE OLBINADO, ALEXANDER RACK, European Synchrotron Radiation Facility, France, DANIEL EAKINS, University of Oxford, United Kingdom —

**12:00PM S5.00005 New approaches to high-precision measurements of heterogeneous materials and the path to predictive models: Controlling variation, measuring in situ brittle failure, and understanding their complex dynamic response<sup>1</sup>**, MINTA AKIN, Lawrence Livermore Natl Lab —

<sup>1</sup>This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344. This work was supported by the LDRD program under grant 16-ERD-010.

**Thursday, June 20, 2019 11:00AM - 12:30PM —**

**Session S6 GPS: Planetary Impacts** Broadway III/IV - Federica Coppari, Lawrence Livermore National Laboratory

**11:00AM S6.00001 The delivery of water during impacts: The view from experiments**, R. TERIK DALY, Johns Hopkins University Applied Physics Lab —

**11:30AM S6.00002 Multi-material hydrodynamics modeling of asteroid impacts at oblique shock interfaces** , ROSEANNE CHENG, TARIQ ASLAM, Los Alamos National Laboratory —

**11:45AM S6.00003 Forsterite Shock-and-Release: Temperature and Density on the Liquid-Vapor Curve<sup>1</sup>** , ERIK DAVIES, MEGAN DUNCAN, SARAH STEWART, DYLAN SPAULDING, U. California Davis, SETH ROOT, DAVID BLISS, Sandia National Labs, RICHARD KRAUS, Lawrence Livermore National Lab, STEIN JACOBSEN, Harvard —

<sup>1</sup>Z Fundamental Science Program; DOE-NNSA grant DE-NA0002937; NASA NNX15AH54G and NNX16AP35H; UC Office of the President grant LFR-17-449059. SNL is managed by NTESS under DOE-NNSA contract DE-NA0003525. Prepared by LLNL under Contract DE-AC52-07NA27344.

**12:00PM S6.00004 Shock physics of giant impacts: Transforming rocky planets into supercritical synestias<sup>1</sup>** , SARAH STEWART, ERIK DAVIES, MEGAN DUNCAN, U. California Davis, SIMON LOCK, Caltech, SETH ROOT, JOSHUA TOWNSEND, Sandia National Labs, RAZVAN CARACAS, CNRS, RICHARD KRAUS, Lawrence Livermore National Lab, STEIN JACOBSEN, Harvard —

<sup>1</sup>Z Fundamental Science Program; DOE-NNSA DE-NA0002937; NASA NNX15AH54G and NNX16AP35H; UC Office of the President LFR-17-449059. SNL is managed by NTESS under DOE-NNSA contract DE-NA0003525. Prepared by LLNL under Contract DE-AC52-07NA27344.

**12:15PM S6.00005 Planets and stars in the laboratory: the Z Fundamental Science Program** , THOMAS R. MATSSON, MARCUS D. KNUDSON, Sandia National Laboratories —

**Thursday, June 20, 2019 2:00PM - 3:00PM —**

**Session T1 DSIC: EOS, Sub-Detonation Response, Multi-shock: Models 2** Grand Ballroom I - Leah Tuttle, SNL

**2:00PM T1.00001 A CREST Model for the RDX/TNT Explosive Composition B** , NICHOLAS WHITWORTH, CAROLINE HANDLEY, AWE —

**2:15PM T1.00002 Modeling Mach Stem Initiation of 9502** , ERIC MAS, LARRY HULL, PHILLIP MILLER, ERIK MORO<sup>1</sup>, IAN FLEMING, Los Alamos National Laboratory —

<sup>1</sup>Currently with Modern Technology Solutions, Inc. (MTSI) in Beavercreek, OH 45431

**2:30PM T1.00003 Reactive Monte Carlo Validation of Thermochemical Equations of State of High Explosives** , JEFFERY LEIDING, CHRISTOPHER TICKNOR, STEPHEN ANDREWS, DARIO PANICI, CURTIS PETERSON, Los Alamos National Laboratory —

**2:45PM T1.00004 Study of Detonation Reaction Zone and Energy Release Characteristics of the Nitrogen-rich Energetic Ionic Salt TKX-50** , KAIYUAN TAN, 1.Institute of Chemical Materials, CAEP; 2.Beijing Institute of Technology, YONG HAN, JIAHUI LIU, ZHIJIAN YANG, XIAOJUN LU, Institute of Chemical Materials, CAEP, FENGLI HUANG, Beijing Institute of Technology —

**Thursday, June 20, 2019 2:00PM - 3:00PM —**

**Session T2 TMS: Mesoscale Explosive Initiation II** Grand Ballroom II - Barrett Hardin, AFRL

**2:00PM T2.00001 Investigating Shock Response of a PETN Based Explosive with Grain-Scale Simulations<sup>1</sup>** , GRAHAM KOSIBA, KEO SPRINGER, WILLIAM SHAW, RICHARD GEE, Lawrence Livermore National Laboratory —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344. LLNL-ABS-768473

**2:15PM T2.00002 Pore collapse in single-crystal TATB under shock compression<sup>1</sup>** , MATT NELMS, MATTHEW KROONBLAWD, RYAN AUSTIN, Lawrence Livermore Natl Lab —

<sup>1</sup>This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344 (LLNL-ABS-768217)

**2:30PM T2.00003 Hot spot ignition through shear banding in TATB single crystals shocked to detonation pressures** , MATTHEW KROONBLAWD, LAURENCE FRIED, Lawrence Livermore National Laboratory —

**2:45PM T2.00004 Molecular dynamics and continuum studies of shock-induced pore collapse in TATB** , TOMMY SEWELL, PUHAN ZHAO, University of Missouri, S. LEE, H.S. UDAYKUMAR, University of Iowa —

## **Thursday, June 20, 2019 2:00PM - 3:00PM —**

**Session T3 AETD: Radiography and Tomography 2** Pavilion East - Laura Smilowitz, LANL

**2:00PM T3.00001 New proton radiography diagnostics.** , C. L. MORRIS, MATTHEW FREEMAN, LEVI NEUKIRCH, FESSEHA MARIAM, ALEXANDER SAUNDERS, SKY SJUE, ZHAOWEN TANG, ZHEHUI WANG, Los Alamos National Laboratory —

**2:15PM T3.00002 Feasibility Studies of the Use of Inelastic X-ray scattering as a Temperature Diagnostic of Transiently Compressed Matter** , OLIVER KARNBACH, DAVID MCGONEGLE, GIANLUCA GREGORI, JUSTIN WARK, University of Oxford, UK —

**2:30PM T3.00003 X-ray diffraction of dynamically compressed matter on the Z-accelerator<sup>1</sup>** , TOMMY AO, MARIUS SCHOLLMEIER, PATRICIA KALITA, PAUL GARD, JAMES WILLIAMS, CAROLINE BLADA, HEATH HANSHAW, IAN SMITH, JONATHON SHORES, CHRISTOPHER SPEAS, CHRISTOPHER SEAGLE, Sandia National Laboratories

<sup>1</sup>Sandia National Labs is managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a subsidiary of Honeywell International, Inc., for the U.S Dept. of Energys National Nuclear Security Administration under contract DE-NA0003525.

**2:45PM T3.00004 Demonstration of Multi-GeV Electron Radiography** , FRANK MERRILL, JOHN GOETT, JOHN GIBBS, SETH IMHOFF, FESSEHA MARIAM, CHRISTOPHER MORRIS, LEVI NEUKIRCH, JOHN PERRY, DANIEL POULSON, RASPBERRY SIMPSON, PETR VOLEGOV, PETER WALSTROM, CARL WILDE, Los Alamos National Laboratory, CARSTEN HAST, KEITH JOBE, TONEE SMITH, Stanford National Accelerator Laboratory, ULI WIENANDS, Argonne National Laboratory, AMY CLARKE, Colorado School of Mines —

## **Thursday, June 20, 2019 2:00PM - 3:00PM —**

**Session T4 MS: Materials Science I** Pavilion West - Brian Jensen, LANL

**2:00PM T4.00001 Thermal Conductivity Measurement at Static High Pressure and Dynamic High Temperature** , RYAN STEWART MCWILLIAMS, School of Physics and Astronomy, University of Edinburgh

**2:30PM T4.00002 Sound Velocity in Shocked Iron, Copper, and Beryllium to 1500 GPa** , MARGARET HUFF, LINDA CRANDALL, RYAN RYGG, BRIAN HENDERSON, MOHAMED ZAGHOO, Laboratory for Laser Energetics, GILBERT COLLINS, None, CHAD MCCOY, Sandia National Laboratories, DAYNE FRATANDUONO, PETER CELLIERS, JOHN EGGERT, Lawrence Livermore National Laboratories —

**2:45PM T4.00003 Dynamic Longitudinal Sound Velocity Measurements in Lead** , MARK COLLINSON, AWE —

## **Thursday, June 20, 2019 2:00PM - 3:00PM —**

**Session T5 PPCM: Advances in Granular Materials** Broadway I/II - John Lang, LANL

**2:00PM T5.00001 Shear Enhanced Dynamic Compaction of a Granular Ceramic<sup>1</sup>** , XIANGYU SUN<sup>2</sup>, KT RAMESH<sup>3</sup>, Johns Hopkins University, ARMY RESEARCH LAB COLLABORATION<sup>4</sup> —

<sup>1</sup>ARL

<sup>2</sup>PhD candidate

<sup>3</sup>Director of Hopkins Extreme Materials Institute

<sup>4</sup>ARL provides us the granular materials for testing

**2:15PM T5.00002 In situ observation of material flow in composite media under shock compression<sup>1</sup>** , DAVID BOBER, JONATHAN LIND, MUKUL KUMAR, Lawrence Livermore National Laboratory —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

**2:30PM T5.00003 Stochastic Shock Observations from Plate Impact of Porous Tantalum<sup>1</sup>**, NATHAN MOORE, GARY CHANTLER, ANDREW VACKEL, JACK WISE, Sandia National Laboratories, REEJU POKHAREL, DONALD BROWN, Los Alamos National Laboratory —

<sup>1</sup>Supported by the Laboratory Directed Research and Development program at Sandia National Laboratories, a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC., a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA-0003525

**2:45PM T5.00004 Shock Loading and Unloading Experiments on Thermally-Sprayed Porous Tantalum\***, J. L. WISE, N. W. MOORE, A. VACKEL, W. M. SCHERZINGER, C. A. MCCOY, G. R. CHANTLER, Sandia National Laboratories —

**Thursday, June 20, 2019 2:00PM - 3:00PM —**

**Session T6 SMGPB: Shock Waves in Polymers** Broadway III/IV - William Proud, Imperial College London

**2:00PM T6.00001 Shockwave interactions with additively-manufactured polymer structures**, DANA DATTELBAUM<sup>1</sup>, BRITTANY BRANCH<sup>2</sup>, BRIAN PATTERSON<sup>3</sup>, AXINTE IONITA<sup>4</sup>, Los Alamos National Laboratory, LOS ALAMOS NATIONAL LABORATORY TEAM —

<sup>1</sup>Explosives Science and Shock Physics Division

<sup>2</sup>Materials Science and Technology Division

<sup>3</sup>Materials Science and Technology Division

<sup>4</sup>Theoretical Division

**2:15PM T6.00002 Shock Propagation and Deformation of Additively-Manufactured Polymer Foams with Engineered Porosity**, DAVID LACINA, University of Dayton Research Institute, CHRISTOPHER NEEL, Air Force Research Laboratory-RWMW, JONATHAN SPOWART, Air Force Research Laboratory-RXCCM, GEOFFREY FRANK, ANDREW ABBOTT, University of Dayton Research Institute, BRITTANY BRANCH, Los Alamos National Laboratory —

**2:30PM T6.00003 Reactive wave structures in shock compressed polyimide**, RACHEL HUBER, DANA DATTELBAUM, LEE GIBSON, Los Alamos National Laboratory, RICHARD GUSTAVSEN, STEPHEN SHEFFIELD, Retired —

**2:45PM T6.00004 Improved Polymer Equations of State**, KATIE MAERZKE, JOSHUA COE, J. TINKA GAMMEL, Los Alamos National Laboratory —

**Thursday, June 20, 2019 3:15PM - 4:45PM —**

**Session U1 DSIC: Deflagration-to-detonation transition and hotspots** Grand Ballroom I - Blaine Asay, SNL / Springhill

**3:15PM U1.00001 The effect of quasi-static mechanical pre-load on deflagration violence in PBX 9501**, MATTHEW HOLMES, GARY PARKER, ROBERT BROILO, ERIC HEATWOLE, TREVOR FEAGIN, PETER SCHULZE, Los Alamos National Laboratory —

**3:30PM U1.00002 Shock Compression Dynamics of Double-layer Explosive Charges<sup>1</sup>**, WEI ZHANG<sup>2</sup>, University of Illinois at Urbana-Champaign, WILL BASSETT, Lawrence Livermore National Laboratory, MEYSAM AKHTAR, LAWRENCE SALVATI, DANA DLOTT, University of Illinois at Urbana-Champaign —

<sup>1</sup>Wei Zhang acknowledges support from the China Scholarship Council for work performed at the University of Illinois at Urbana-Champaign .

<sup>2</sup>The present institution is Nanjing University of Science and Technology. This research was carried in University of Illinois at Urbana-Champaign as a Visiting Scholar.

**3:45PM U1.00003 Using Measured Hot Spot Temperatures in the Statistical Hot Spot Model**, CRAIG TARVER, Lawrence Livermore Natl Lab —

**4:00PM U1.00004 Investigating the evolution of the optical emission spectra of HMX with reaction regime**, OLIVIA J. MORLEY, DAVID M. WILLIAMSON, University of Cambridge —

**4:15PM U1.00005 Modeling the shock-induced multiple reactions in a random bed of metallic granules in an energetic material**, JACK YOH, Seoul National University, BOHOON KIM, Caltech, SANGHUN CHOI, Seoul National University, EXTREME ENERGY LABORATORY TEAM —

**4:30PM U1.00006 Analysis of Chemistry in Reactive Molecular Dynamics Simulations**, EDWARD KOBER, Los Alamos National Laboratory —

**Thursday, June 20, 2019 3:15PM - 4:45PM —**

**Session U2 TMS: Mesoscale Explosive Initiation III** Grand Ballroom II - Ryan Wixom, SNL

**3:15PM U2.00001 Hot spot criticality in shocked octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine over a range of pores sizes and pressures**, H. KEO SPRINGER, SORIN BASTEA, JAMES GAMBINO, Lawrence Livermore National Laboratory —

**3:30PM U2.00002 Mesh Dependence of Initiation Threshold in the Presence of Mesoscale Porosity**, DAVID HARDIN, Air Force Research Laboratory, Munitions Directorate, H. KEO SPRINGER, Lawrence Livermore National Lab, NIRMAL RAI, University of Iowa, SUSHILKUMAR KOUNDINYAN, Air Force Research Laboratory, Munitions Directorate, G. "CHIP" BUTLER, University of Dayton Research Institute —

**3:45PM U2.00003 Addressing the gap between meso(grain) and continuum scales with stochastic burn models and probability density function theory<sup>1</sup>**, DAVID KITTELL, Sandia National Laboratories —

<sup>1</sup>Sandia National Laboratories is a multi-mission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC., a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525

**4:15PM U2.00004 Influence of Pore Structure on Initiation Threshold in HMX**, G. "CHIP" BUTLER, University of Dayton Research Institute, D BARRETT HARDIN, JESUS MARES, Air Force Research Laboratory, Munitions Directorate, JAMES VITARELLI, University of Dayton Research Institute, ERIC WELLE, CHRISTOPHER MOLEK, Air Force Research Laboratory, Munitions Directorate —

**4:30PM U2.00005 Effect of Shape Resolution on the Simulated Energetic Response of Shock Induced Pore Collapse within HMX.**, JESUS MARES JR., D BARRETT HARDIN, G "CHIP" BUTLER, AFRL, JAMES VITARELLI, University of Dayton Research Institute, CHRISTOPHER MOLEK, AFRL —

**Thursday, June 20, 2019 3:15PM - 4:45PM —**

**Session U3 AETD: Temperature Diagnostics 2** Pavilion East - Dan Dolan, SNL

**3:15PM U3.00001 Microscale In-situ High-speed Imaging of Temperature and Deformation Fields**, AMIRREZA KEYHANI, YANG RONG, MIN ZHOU, The George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0405, USA —

**3:30PM U3.00002 Raman Thermometry Measurements of Shocked Explosives**, SHAWN MCGRANE, TARIQ ASLAM, Los Alamos National Laboratory —

**3:45PM U3.00003 Influence of Temperature Effects on the Dynamic Tensile Extrusion of Molybdenum**, CARL TRUJILLO, GEORGE GRAY III, MICHAEL BURKETT, ELLEN CERRETA, DANIEL MARTINEZ, VERONICA LIVESCU, Los Alamos National Laboratory —

**4:00PM U3.00004 Debye-Waller Temperature Measurement of Shock Compressed Solids<sup>1</sup>**, ANDREW HIGGINBOTHAM, ASHLEY POOLE, University of York, ANDREW COMLEY, EMMA FLOYD, JOHN FOSTER, AWE PLC, CAROLINE LUMSDON, University of York, DAVID MCGONEGLE, University of Oxford, ANTHONY MEADOWCROFT, STEVE ROTHMAN, AWE PLC, JUSTIN WARK, University of Oxford —

<sup>1</sup>This work was supported under EPSRC grants EP/P024777/1 and EP/L01663X/1 with additional support from AWE.

**4:15PM U3.00005 Temperature measurements to complete equations of state<sup>1</sup>**, MINTA AKIN, RYAN CRUM, YEKATERINA OPACHICH, Lawrence Livermore Natl Lab, ERIC DUTRA, MSTs, DAVID BRANTLEY, DAWN GRANINGER, MARKUS DAENE, PHILIP MYINT, RICKY CHAU, Lawrence Livermore Natl Lab —

<sup>1</sup>This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.



**4:30PM U3.00006 Shock temperature of laser-driven materials at extreme conditions.**<sup>1</sup> , ZHIYU HE, XIUGUANG HUANG<sup>2</sup>, Shanghai Institute of Laser Plasma, PHYSICAL PROPERTIES OF MATERIALS TEAM —

<sup>1</sup>National Key Research and Development Program of China

<sup>2</sup>Director of Research Department of Shanghai Institute of Laser Plasma

**Thursday, June 20, 2019 3:15PM - 4:30PM —**  
**Session U4 MS: Materials Science II** Pavilion West - Marcus Knudson, SNL

**3:15PM U4.00001 Dynamic Strength of Soda-Lime Glass at High Pressures and Strain Rates**<sup>1</sup> , CHRISTIAN KETTENBEIL, ZEV LOVINGER, Caltech, TONG JIAO, RODNEY CLIFTON, Brown University, GURUSWAMI RAVICHANDRAN, Caltech —

<sup>1</sup>Office of Naval Research

**3:30PM U4.00002 Equation of State Studies for Lead Glass**<sup>1</sup> , BERNARDO FARFAN, WILLIAM REINHART, SCOTT ALEXANDER, Sandia National Laboratories —

<sup>1</sup>Sandia National Laboratories is managed and operated by NTESS under DOE NNSA contract DE-NA0003525.

**3:45PM U4.00003 Shock Response of Solid CeO<sub>2</sub> to 25 GPa** , JOHN LANG, Los Alamos National Laboratory, JUSTIN STEINER, Georgia Institute of Technology, ANIRBAN MANDAL, AUSTIN GOODBODY, Los Alamos National Laboratory —

**4:00PM U4.00004 Off-Hugoniot shock compression of Zirconium probed at the microstructural and nanosecond scales with in situ x-ray diffraction.**<sup>1</sup> , PATRICIA KALITA, JUSTIN BROWN, PAUL SPECHT, SETH ROOT, Sandia National Laboratories , MELANIE WHITE, ANDREW CORNELIUS, HIPSEC, University of Nevada Las Vegas, JESSE SMITH, HPCAT, Argonne National Laboratory —

<sup>1</sup>SNL is managed and operated by NTESS under DOE NNSA contract DE-NA0003525 Portions of this work were performed at DCS (Sector 35), APS, ANL. DCS is operated by WSU under the U.S. DOE/NNSA award no. DE-NA0002442. Portions of this work were performed at HPCAT (Sector 16), APS, ANL. HPCAT operations are supported by DOE-NNSA's Office of Experimental Sciences. The APS is a U.S. DOE Office of Science User Facility operated for the DOE Office of Science by ANL under Contract No. DE-AC02-06CH11357.

**4:15PM U4.00005 The origin of the Hugoniot Elastic Limit Spike and Precursor Decay and the interplay between dislocation nucleation and glide** , ROMAN KOSITSKI, Technion - Faculty of Mechanical Eng. —

**Thursday, June 20, 2019 3:15PM - 4:45PM —**  
**Session U5 PPCM: Validating Porous Models** Broadway I/II - Christopher Neel, AFRL

**3:15PM U5.00001 (U) The Effect of Initial Pressed Density on the Dynamic Densification Behavior of Brittle Granular Materials**<sup>1</sup> , TRAVIS VOORHEES, JUSTIN STEINER, Georgia Institute of Technology, D. ANTHONY FREDENBURG, Los Alamos National Laboratory, GREGORY KENNEDY, NARESH THADHANI, Georgia Institute of Technology —

<sup>1</sup>Department of Energy National Nuclear Security Administration Laboratory Residency Graduate Fellowship under contract DE-NA0003864

**3:30PM U5.00002 A volume-filtered description of shock-particle interactions**<sup>1</sup> , GREGORY SHALLCROSS, JESSE CAPECELATRO, University of Michigan —

<sup>1</sup>This work was supported by a NASA Space Technology Research Fellowship

**3:45PM U5.00003 Rate Effects on Shear Strength in Granular Compaction**<sup>1</sup> , MICHAEL HOMEL, ERIC HERBOLD, Lawrence Livermore Natl Lab —

<sup>1</sup>Prepared by LLNL under Contract DE-AC52-07NA27344.

**4:00PM U5.00004 Cylindrical Driven Shocks in Ceria<sup>1</sup>**, T J VOORHEES, Georgia Institute of Technology, M S FREEMAN, C L ROUSCULP, D A FREDENBURG, J T BRADLEY, P M DONOVAN, FRANK FIERO, J R GRIEGO, J C LAMAR, F G MARIAM, LEVI P NEUKIRCH, D M ORO, A R PATTEN, R B RANDOLPH, W A REASS, R E REINOVSKY, A SAUNDERS, S SJUE, Z TANG, Los Alamos National Laboratory, P J TURCHI, Retired —

<sup>1</sup>This work was supported by the US Department of Energy through the Los Alamos National Laboratory. Los Alamos National Laboratory is operated by Triad National Security, LLC, for the National Nuclear Security Administration of U.S. Department of Energy (Contract No. 89233218CNA000001)

**4:15PM U5.00005 Progress toward development of a predictive dynamic compaction model framework**, D FREDENBURG<sup>1</sup>, Los Alamos National Laboratory —

<sup>1</sup>Ted Carney is a contributing author.

**Thursday, June 20, 2019 3:15PM - 4:30PM —**

**Session U6 SMGPB: Biomaterials** Broadway III/IV - David Williamson, University of Cambridge

**3:15PM U6.00001 Stress wave propagation and cavitation in gelatin due to ballistic impact**, SIKHANDA SATAPATHY<sup>1</sup>, US Army Research Laboratory —

<sup>1</sup>Collaborators: Jason McDonald, James Gurganus, Ajmer Dwivedi

**3:45PM U6.00002 Modeling dynamic finite deformation and stress wave mechanics in the lung**, JOHN CLAYTON, ROHAN BANTON, US Army Rsch Lab - Aberdeen, ALAN FREED, Texas AM University —

**4:00PM U6.00003 CTH Simulation of a Shockwave Interaction with the Human Thorax**, DOUGLAS COLDWELL, University of Louisville —

**4:15PM U6.00004 Investigation of dynamic failure properties of biological materials to model human soft tissues in primary blast injury**, JAMES LEE, DANYAL MAGNUS, Department of Physics, Imperial College London, DAVID SORY, Department of Physics/Centre for Blast Injury Studies, Imperial College London, MANSOOR KHAN, Department of Surgery and Cancer, Imperial College London, WILLIAM PROUD, Department of Physics, Imperial College London, INSTITUTE OF SHOCK PHYSICS COLLABORATION —

**Thursday, June 20, 2019 5:00PM —**

**Session V1 Poster Session II** Atrium Ballroom -

**V1.00001 Incorporating inertia effects in spectral methods: An application to elastically-shocked metallic materials**, PAUL LAFOURCADE, CEA DAM DIF, RICARDO LEBENSOHN, T-Division, LANL, CHRISTOPHE DENOUAL, CEA DAM DIF —

**V1.00002 Development of lower-adiabat drives for Rayleigh-Taylor strength experiments.**<sup>1</sup>, T.E. LOCKARD, M.P. HILL, A.G. KRYGIER, A.B. ZYLSTRA, Lawrence Livermore Natl Lab, P. GRAHAM, AWE Plc, P.D. POWELL, D.C. SWIFT, S.T. PRISBEY, H.-S. PARK, J.M. MCNANEY, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344

**V1.00003 Role of pre-existing dislocation loops on the shock compression and spall behavior of FCC metals**, KE MA, JIE CHEN, GARVIT AGARWAL, AVINASH DONGARE, University of Connecticut —

**V1.00004 Unraveling the Effect of Laser Fluence and Loading Orientation on the Spallation of Cu and Al microstructures at Atomic Scales.**, MARCO ECHEVERRIA, SERGEY GALITSKIY, AVINASH DONGARE, University of Connecticut —

**V1.00005 Damage Initiation and Evolution in Nanoscale Multiphase Metallic Microstructures Under Shock Loading Conditions at Atomic Scales.**, MARCO ECHEVERRIA, SUMIT SURESH, SERGEY GALITSKIY, AVINASH DONGARE, University of Connecticut —

**V1.00006 Molecular dynamics simulations of grain interactions in shock-compressed highly-textured columnar polycrystals**, PATRICK HEIGHWAY, DAVID MCGONEGLE, University of Oxford, UK, NIGEL PARK, AWE, UK, ANDREW HIGGINBOTHAM, University of York, UK, JUSTIN WARK, University of Oxford, UK —

**V1.00007 Shock Compression of Niobium Oxides from First-Principles<sup>1</sup>** , PHILIPPE WECK, KYLE COCHRANE , NATHAN MOORE , Sandia National Laboratories —

<sup>1</sup>SNL is managed and operated by NTESS under DOE NNSA contract DE-NA0003525.

**V1.00008 Modeling the structure of croconic and squeric acids under pressure.** , ISKANDER G. BATYREV, US Army Rsch Lab - Aberdeen —

**V1.00009 Shock-induced alpha-epsilon phase transformation in nanocrystalline iron: Plastic deformation and phase transitions** , HOANG-THIEN LUU, Computational Material Sciences/Engineering, Institute of Applied Mechanics, Clausthal University of Technology, 38678 Clausthal-Zellerfeld, Germany, RAMON J. RAVELO, Physics Department and Materials Research Institute, University of Texas, El Paso, TX, 79968, USA , EDUARDO M. BRINGA, CONICET and Faculty of Engineering, University of Mendoza, Mendoza, 5500, Argentina, TIMOTHY C. GERMANN, Theoretical Division, Los Alamos National Laboratory, Los Alamos, NM, 87545, USA, NINA GUNKELMANN, Computational Material Sciences/Engineering, Institute of Applied Mechanics, Clausthal University of Technology, 38678 Clausthal-Zellerfeld, Germany —

**V1.00010 Influence of Combined Normal and Shear Loading on the Hotspot Criticality<sup>1</sup>** , MD MAHBUBUL ISLAM, MICHAEL SAKANO, ALEJANDRO STRACHAN, Purdue University —

<sup>1</sup>This work was support by the US Office of Naval Research, Multidisciplinary University Research Initiatives (MURI) Program, Contract: N00014-16-1-2557. Program managers: Chad Stoltz and Kenny Lipkowitz.

**V1.00011 ABSTRACT WITHDRAWN** —

**V1.00012 A microtomographic toolchain to build models of energetic material microstructures at different level of complexity** , STEVE BELON, CEA, DAM, GRAMAT, F-46500 Gramat, France, BENJAMIN ERZAR, CEA, DAM, GRAMAT, F46500 Gramat, France, ELODIE KAESHAMMER, CEA, DAM, GRAMAT, F-46500 Gramat, France —

**V1.00013 Effects of natural variability on the dynamic strength of chondrite meteorites for asteroid hazard mitigation** , BENJAMIN BRUGMAN, Michigan State University, DAWN GRANINGER, Lawrence Livermore National Laboratory, LAURA RIORDAN-CHEN, European Molecular Biology Laboratory, ERIC HERBOLD, MEGAN SYAL, Lawrence Livermore National Laboratory, SUSANNAH DORFMAN, Michigan State University, DAMIAN SWIFT, Lawrence Livermore National Laboratory —

**V1.00014 High Strain Rate Properties of Water Ice.** , RYAN POTTER, JOSEPH CAMMACK, TOM POLLARD, CHRISTOPHER BRAITHWAITE, University of Cambridge —

**V1.00015 X-ray diffraction study of laser-shocked forsterite (Mg<sub>2</sub>SiO<sub>4</sub>) from 20-130 GPa<sup>1</sup>** , D. KIM, E. BERRYMAN, S. HAN, T. DUFFY, Princeton, S. TRACY, Carnegie Institution, A. GLEASON, Stanford, C. BLOME, LANL, K. APPEL, M. SCHOELMERICH, European XFEL, V. PRAKAPENKA, Uni. of Chicago, H. LEE, B. NAGLER, SLAC, R. SMITH, M. AKIN, J. EGGERT, LLNL, P. ASIMOW, Caltech —

<sup>1</sup>Work supported by DOE/FES

**V1.00016 First experimental synthesis of Al<sub>62</sub>Cu<sub>31</sub>Fe<sub>7</sub> icosahedral quasicrystals and their natural origin in a meteorite by impact processes<sup>1</sup>** , PAUL ASIMOW, JINPING HU, CHI MA, Caltech, LUCA BINDI, Universit degli Studi di Firenze, Italy —

<sup>1</sup>NASA 80NSSC18K0532

**V1.00017 Ramp Compression of Gold to 690 GPa<sup>1</sup>** , SIRUS HAN, Princeton University, JUNE WICKS, Johns Hopkins University, RAYMOND SMITH, Lawrence Livermore National Laboratory, DONGHOON KIM, Princeton University, JON EGGERT, Lawrence Livermore National Laboratory, THOMAS DUFFY, Princeton University —

<sup>1</sup>Work supported by DOE/NNSA/NLUF

**V1.00018 Particle Size Effects on the Detonation Velocity of Nitramine Containing Compositions** , VICTOR BELLITTO, Naval Surface Warfare Center-IHEODTD, MIKHAIL MELNIK, Kennesaw State University, MARY SHERLOCK, JOSEPH CHANG, JOHN OCONNOR, JOSEPH MACKKEY, Naval Surface Warfare Center-IHEODTD —

**V1.00019 Dynamic behaviour and spall fracture of laser shock-loaded AlSi10Mg alloy obtained by Selective Laser Melting** , MANON LAURENCON, MATEIS, INSA-Lyon, CNRS UMR5510, F-69621, France, THIBAUT DE RESSGUIER, Institut Pprime (UPR 3346), CNRS, ENSMA, Univ. Poitiers, 86961 Futuroscope, France, DIDIER LOISON, Institut de Physique de Rennes, CNRS, Univ. Rennes 1, 35042 Rennes, France, JACQUES BAILLARGEAT, Institut Pprime (UPR 3346), CNRS, ENSMA, Univ. Poitiers, 86961 Futuroscope, France —

**V1.00020 Dynamic properties and behavior of 316L stainless steel** , ROBERT KING, ANNA LLOBET-MEGIAS, GUILLERMO TERRONES, SARYU JINDAL-FENSIN, RUSSELL OLSON, GEORGE GRAY III, CHRISTOPHER MORRIS, DEREK SCHMIDT, ALEXANDER SAUNDERS, AMY TAINTER, WENDY VOGAN-MCNEIL, Los Alamos National Laboratory —

**V1.00021 Pressure-Shear Plate Impact Experiments at Very High Pressures** , CHRISTIAN KETTENBEIL, ZEV LOVINGER, SURAJ RAVINDRAN, MICHAEL MELLO, GURUSWAMI RAVICHANDRAN, California Institute of Technology, 1200 E. California Blvd., Pasadena, CA 91125 —

**V1.00022 Gas-Phase Ion-Neutral Reactions of Cerium Cluster Ions with Deuterium.**<sup>1</sup> , MANUEL MANARD, Special Technologies Laboratory, PAUL KEMPER, University of California, Santa Barbara, RUSTY TRAINHAM, Special Technologies Laboratory, PETER ARMENTROUT, University of Utah, Salt Lake City, LOS ALAMOS NATIONAL LABORATORY COLLABORATION —

<sup>1</sup>Site-Directed Research and Development (SDRD), Mission Support Test

**V1.00023 Shock-driven mixing and turbulence** , ADAM MARTINEZ, JOHN CHARONKO, KATHY PRESTRIDGE , Los Alamos National Laboratory —

**V1.00024 Dynamic strength and failure of additively manufactured Ti-6Al-4V alloy** , VITALY PARIS, PINHAS FRIDMAN, Department of Physics, Nuclear Research Center Negev, Israel, EITHAN TIFERET, Department of Materials, Nuclear Research Center Negev, Israel, ARNON YOSSEF-HAI, Department of Physics, Nuclear Research Center Negev, Israel —

**V1.00025 Using Free Surface Velocity and X-Ray Imaging to Monitor the Closure of a Cylindrical Hole in Copper and Tantalum for Strength Measurements Under Pressure**<sup>1</sup> , ANDREW ROBINSON, JONATHAN LIND, MATTHEW NELMS, NATHAN BARTON, MUKUL KUMAR, Lawrence Livermore National Laboratory —

<sup>1</sup>This work was performed under the auspices of the US Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

**V1.00026 Spall behavior of Aluminium with Helium Bubbles under Laser Shock Loading.** , DAWU XIAO, DONGLI ZOU, Institute of Materials, China Academy of Engineering Physics, Mianyang 621700, China, HUA SHU, Institute of Laser, China Academy of Engineering Physics, Mianyang 621700, China, LIFENG HE, Institute of Materials, China Academy of Engineering Physics, Mianyang 621700, China —

**V1.00027 The Preston-Tonks-Wallace Model Parameterization of FCC-Cerium** , JEEYEON PLOHR, LEONID BURAKOVSKY, SKY SJUE, Los Alamos National Laboratory —

**V1.00028 Characterization of phase transition on Ga<sub>2</sub>O<sub>3</sub> induced by shock-recovery experiment** , HIROAKI KISHIMURA, HITOSHI MATSUMOTO, National Defense Academy of Japan —

**V1.00029 Coupling between plasticity and phase transition in single crystal iron at ultra-high strain rate** , NOUROU AMADOU, Dept de Physique, Univ Abdou Moumouni de Niamey, THIBAUT DE RESSEGUIER, ANDRE DRAGON, Institut P. CNRS. ENSMA. Université de Poitiers, Poitiers, France —

**V1.00030 Fast phase change dynamics as a rapid energy absorption mechanism** , GARETH TEAR, WILLIAM PROUD, Imperial College London —

**V1.00031 The Influence of Hydrogen on the Dynamic Strength and Phase transition of SAE 1020 Steel.** , BENNY GLAM, SHALOM ELIEZER, DANIEL MORENO, Soreq NRC, FREDI SIMCA, NRCN, LIOR BAKSHI, Soreq NRC, DAN ELIEZER, Ben Gurion University, SOREQ NRC COLLABORATION —

**V1.00032 In-situ X-Ray Diffraction of Shock-Compressed Boron Carbide, B<sub>4</sub>C** , BENNY GLAM, Soreq NRC, SALLY JUNE TRACY, Princeton University, RAY SMITH, LLNL, JUNE WICKS, Johns Hopkins University, THOMAS DUFFY, Princeton University —

**V1.00033 Melting and recrystallization of Pb on nanosecond timescales**<sup>1</sup> , AMY LAZICKI, CHRISTOPHER WEHRENBURG, JON EGGERT, Lawrence Livermore Natl Lab, RYAN RYGG, University of Rochester, JAMES MCNANEY, FEDERICA COPPARI, JOEL BERNIER, RICHARD KRAUS, Lawrence Livermore Natl Lab —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344

**V1.00034 Shock-wave study of the metallization of alkali halides up to 5 Mbar** , ORIANNA BALL, R. STEWART MCWILLIAMS, School of Physics and Astronomy and Centre for Science at Extreme Conditions, University of Edinburgh, SUZANNE ALI, JON EGGERT, Lawrence Livermore National Laboratory (LLNL), GILBERT W. COLLINS, Department of Mechanical Engineering, Physics and Astronomy and Laboratory for Laser Energetics, University of Rochester, MATT DIAMOND, RAYMOND JEANLOZ, Department of Earth and Planetary Science and Department of Astronomy, University of California, Berkeley —

**V1.00035 A Multiphase Equation of State for Gold.** , JAKE HAYNES, GEOFFREY COX, AWE, AWE TEAM —

**V1.00036 Experimental sound velocities and Grüneisen parameters for shocked Pb: Comparison with theory** , DAVID BONESS, Physics Department, Seattle University —

**V1.00037 Studying the dynamic properties of cyanoacrylate adhesive in plate impact experiments** , REFAEL HEVRONI, Negev Nuclear Research Center, NATAN KARAEV, ELI GUDINETSKY, Israeli Atomic Energy Commission, VITALY PARIS, ARNON YOSEF-HAI, Negev Nuclear Research Center —

**V1.00038 Sound velocity measurements in shock compressed Al and Cu** , ALEXANDER FEDOTOV GEFEN, Soreq NRC, ELI GUDINETSKY, IAEC, ARNON YOSEF-HAI, NRC Negev, BENNY GLAM, MORIS SUDAI, Soreq NRC, SOREQ NRC COLLABORATION, IAEC COLLABORATION, NRC NEGEV COLLABORATION —

**V1.00039 Measurement of platinum phase to over 2 terapascals<sup>1</sup>** , JAMES MCNANEY, DAMIAN SWIFT, AMY LAZICKI, Lawrence Livermore National Laboratory, RYAN RYGG, University of Rochester, JOEL BERNIER, RICHARD KRAUS, CHRIS WEHREBERG, JON EGGERT, Lawrence Livermore National Laboratory —

<sup>1</sup>This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344

**V1.00040 ABSTRACT WITHDRAWN** —

**V1.00041 Time-resolved x-ray imaging of void collapse at 10 micron length scales<sup>1</sup>** , MICHAEL ARMSTRONG, RYAN AUSTIN, ERIC BUKOVSKY, Lawrence Livermore Natl Lab, PAUL CHOW, Argonne National Laboratory, PAULIUS GRIVICKAS, JOSHUA HAMMONS, BATIKAN KOROGLU, ANDREW ROBINSON, WILLIAM SHAW, TREVOR WILLEY, Lawrence Livermore Natl Lab, YUMING XIAO, Argonne National Laboratory —

<sup>1</sup>Lawrence Livermore National Laboratory is operated by Lawrence Livermore National Security, LLC, for the U.S. Department of Energy, National Nuclear Security Administration under Contract DE-AC52-07NA27344.

**V1.00042 Experiments and modelling of explosive loading of several sands** , S.A. WECKERT, A.D. RESNYANSKY, WCSO, Defence Science and Technology Group, PO Box 1500, Edinburgh SA 5111, Australia —

**V1.00043 Role of Porosity in Dynamic Compaction via In-Situ X-Ray Probes<sup>1</sup>** , RYAN CRUM, Lawrence Livermore Natl Lab, DOROTHY MILLER, University of Tennessee, Knoxville, ERIC HERBOLD, JONATHAN LIND, Lawrence Livermore Natl Lab, RYAN HURLEY, Johns Hopkins University, MICHAEL HOMEL, Lawrence Livermore Natl Lab, BRIAN JENSEN, Los Alamos National Laboratory, MINTA AKIN, Lawrence Livermore Natl Lab —

<sup>1</sup>Work was performed under the auspices of the U.S. DOE by LLNL under Contract DE-AC52-07NA27344 and supported by LLNLs LDRD program under grant 16-ERD-010. Experiments at DCS are supported by DOE / NNSA Award Number DE-NA0002442.

**V1.00044 Characterization of Powders using Scanning White Light Confocal Microscopy** , ADAM GOLDBERGER, KYLE RAMOS, CLAUDINE ARMENTA, RAMON SAAVEDRA, JOHN LAZARZ, ERNIE HARTLINE, GARY WINDLER, CINDY BOLME, Los Alamos National Laboratory —

**V1.00045 Modeling Dynamic Rate Dependent Pore Closure with a Range of Pore Sizes** , YEHUDA PARTOM, Retired —

**V1.00046 Formulation of experimental methods for measuring the shear strength of granular materials** , CHRISTOPHER COFFELT, LANL —

**V1.00047 Numerical simulations of shock wave propagation in granular materials with the multi-phase particle-in-cell method<sup>1</sup>** , KUN XUE, Beijing Institute of Technology —

<sup>1</sup>China natural science foundation grant No. U1730111

**V1.00048 Constitutive modelling of shock compression of porous materials with two condensed constituents** , A.D. RESNYANSKY, WCSO, Defence Science and Technology Group, PO Box 1500, Edinburgh SA 5111, Australia —

**V1.00049 Molecular dynamic study of mechanical behavior of cis-PB under shock loading** , NICOLAS PINEAU, GAUTIER LECOUTRE, CLAIRE LEMARCHAND, LAURENT SOULARD, CEA/DAM/DIF —

**V1.00050 Synthesis and Mechanical Characterization of Polyurethane Reinforced with Halloysite Nanotubes** , RAFAELA AGUIAR, OREN PETEL, RONALD MILLER, ANTON LEBAR, ANDREW ODDY, Carleton University —

**V1.00051 X-ray phase contrast imaging to study the effects of feedstock chemistry on shockwave behavior in additive manufactured foams** , BRITTANY BRANCH, KWAN-SOO LEE, SAMANTHA TALLEY, JOSHUA COE, DANA DATTELBAUM, Los Alamos National Laboratory, C2 COLLABORATION —

**V1.00052 Electronic transport properties of  $\text{Li}_2\text{SnX}_3$  ( $X=\text{S}, \text{Se}$ ) from first principles calculation** , ENAMUL HAQUE, MD. ANWAR HOSSAIN, Mawlana Bhashani Science and Technology University —

**V1.00053 Preparation of Graphene Materials through Pulsed Wire Discharge<sup>1</sup>** , XIN GAO, kumamoto university, HAO YIN, China Academy of Engineering Physics, CHUNXIAO XU, Beijing Institute of Technology, SHIGERU TANAKA, KAZUYUKI HOKAMOTO, kumamoto university, PENGWAN CHEN, Beijing Institute of Technology —

<sup>1</sup>This work is supported by the National Natural Science Foundation of China under grant nos. 11521062 and 11172043.

**V1.00054 Hypersonic Cryogenics: Stochastic Shock Compression Modelling<sup>1</sup>** , CHARLES JANEKE, No Company Provided —

<sup>1</sup>Constellation Dynamics, Los Angeles // Advanced Propulsion Lab, Virginia Tech Blacksburg

**V1.00055 Study of soft material blast mitigation effects using a shock tube** , DANYAL MAGNUS, Department of Physics, Imperial College London, DAVID R. SÓRY, Dept of Physics; Centre for Blast Injury Studies, Imperial College London, JAMES LEE, Department of Physics, Imperial College London, MANSOOR KHAN, Department of Surgery and Trauma, Imperial College London, WILLIAM PROUD, Department of Physics, Imperial College London —

**V1.00056 Probing ultrafast shock-induced chemistry in liquids using broad-band mid-infrared absorption spectroscopy** , PAMELA BOWLAN, MICHAEL POWELL, ROMAIN PERRIOT, ENRIQUE MARTINEZ, EDWARD KOBER, MARC CAWKWELL, SHAWN MCGRANE, Los Alamos National Laboratory —

**Friday, June 21, 2019 8:00AM - 8:30AM —**

Session X1 Plenary Session V Grand Ballroom I/II - Jennifer Jordan, LANL

8:00AM X1.00001 TBD , FEDERICA COPPARI, LLNL —

**Friday, June 21, 2019 9:15AM - 10:45AM —**

Session Y1 DSIC: Initiation and Growth Grand Ballroom I - David Damm, SNL

**9:15AM Y1.00001 What we can learn from quantum molecular dynamics simulations of detonation chemistry: extracting reaction rates, and the search for intermediates** , ROMAIN PERRIOT, Los Alamos National Laboratory —

**9:45AM Y1.00002 Probabilistic Assessment of the Effects of Microstructure and Voids on the Pop Plot of Heterogeneous Energetic Materials<sup>1</sup>** , CHRISTOPHER MILLER, DANIEL OLSEN, YAOCHI WEI, Georgia Institute of Technology, DAVID KITTELL, COLE YARRINGTON, Sandia National Laboratories, MIN ZHOU, Georgia Institute of Technology —

<sup>1</sup>This work is supported by the Sandia LDRD AA program, an AFOSR project (Dr. Martin Schmidt), and the NNSA SSGF.

**10:00AM Y1.00003 The Mechanism of Response of Detonators to AC Mains Voltage** , ELIZABETH LEE, Atomic Weapons Establishment —

**10:15AM Y1.00004 Understanding Spark formation and Growth in Inert Porous Media and the Implications for the Response of Low Density PETN to ESD.** , RODNEY DRAKE, DANIEL CHESTER, ANTHONY GLAUSER, JOHN RICHARDSON, NEIL WATKINS, LEE WEBB, Atomic Weapons Establishment —

**10:30AM Y1.00005 Probing Shock-Initiation of Plastic-Bonded Explosives with a Tabletop Microscope** , LAWRENCE SALVATI, University of Illinois at Urbana-Champaign, WILL BASSETT, Lawrence Livermore National Laboratory, BELINDA JOHNSON, ZHIWEI MEN, DANA DLOTT, University of Illinois at Urbana-Champaign —

## Friday, June 21, 2019 9:15AM - 10:45AM –

Session Y2 TMS: Mesoscale Explosive Initiation IV Grand Ballroom II - Brian Henson, LANL

**9:15AM Y2.00001 Computational investigation of preshock desensitization of liquid nitromethane with air-filled cavities<sup>1</sup>**, XIAOCHENG MI, LOUISA MICHAEL, NIKOLAOS NIKIFORAKIS, University of Cambridge, ANDREW J. HIGGINS, McGill University —

<sup>1</sup>This work is supported by NSERC Postdoctoral Fellowship (PDF-502505-2017).

**9:30AM Y2.00002 Direct comparison of computations and experiments on void collapse in PMMA over a range of loading conditions.<sup>1</sup>**, NIRMAL RAI, University of Iowa, EMILIO ESCUARIZA, DAN EAKINS, The University of Oxford, H.S. UDAYKUMAR, The University of Iowa —

<sup>1</sup>The authors gratefully acknowledge the financial support from EGLIN AFB, AFRL/RWML (program manager: Dr. Angela Diggs) under the Contract No. FA8651-16-1-0005.

**9:45AM Y2.00003 Approximating Reaction Chemistry of Energetics for Critical Velocity Predictions**, SUSHILKUMAR KOUNDINYAN, D. BARRETT HARDIN, Air Force Research Laboratory —

**10:00AM Y2.00004 Single crystal plasticity model with deformation twinning for the high rate deformation of  $\beta$ -HMX**, MILOVAN ZECEVIC, DARBY LUSCHER, MARC CAWKWELL, FRANCIS ADDESSIO, Theoretical Division, Los Alamos National Laboratory, Los Alamos, NM, 87544, USA, KYLE RAMOS, Explosive Science and Shock Physics Division, Los Alamos National Laboratory, Los Alamos, NM, 87544, USA —

**10:15AM Y2.00005 Mechanistic Modeling of Shock to Detonation Transition in High Explosives at Mesoscale<sup>1</sup>**, AHMED HAMED, MARISOL KOSLOWSKI, Purdue University —

<sup>1</sup>This work was supported by the US Department of Defense, Office of Naval Research, MURI contract number N00014-16-1-2557, program managers: Kenny Lipkowitz and Chad Stoltz.

**10:30AM Y2.00006 Modeling the effect of plasticity and damage in  $\beta$ -HMX single crystals under shock loading**, CAMILO DUARTE, MARISOL KOSLOWSKI, Purdue University, NICOLO GRILLI, University of Oxford —

## Friday, June 21, 2019 9:15AM - 10:30AM –

Session Y3 Abstract Withdrawn Pavilion East - Shawn McGrane, LANL

**9:30AM Y3.00002 Shock compression microscopy: shocked materials with high time and space resolution**, DANA DLOTT, University of Illinois at Urbana-Champaign —

**9:45AM Y3.00003 A Broadband Reflectance Diagnostic for Matter at Extreme Conditions**, BRIAN HENDERSON, MOHAMED ZAGHOO, RYAN RYGG, DANAE POLSIN, TOM BOEHLY, University of Rochester, LLE, GILBERT COLLINS, None, SUZANNE ALI, PETER CELLIERS, AMY LAZICKI, MARTIN GORMAN, MARIUS MILLOT, RICHARD BRIGGS, JON EGGERT, Lawrence Livermore National Laboratory, MALCOLM MCMAHON, University of Edinburgh, UNIVERSITY OF EDINBURGH COLLABORATION, LAWRENCE LIVERMORE NATIONAL LABORATORY COLLABORATION, UNIVERSITY OF ROCHESTER, LLE TEAM —

**10:00AM Y3.00004 Emissivity change in pressure-shear plate impact experiment**, TONG JIAO, PINKESH MALHOTRA, RODNEY CLIFTON, Brown University, SCHOOL OF ENGINEERING, BROWN UNIVERSITY TEAM —

**10:15AM Y3.00005 Refractive index measurements of atomic, molecular and mixed gases at high pressures up to 60 MPa**, CHENGJUN LI, QIFENG CHEN, YUNJUN GU, LEI LIU, GUOJUN LI, ZHIGUO LI, China Academy of Engineering Physics —

## Friday, June 21, 2019 9:15AM - 10:45AM –

Session Y4 MS: Anisotropy & Orientation-Dependent Behavior Pavilion West - Jason Scharff, MSTs

**9:15AM Y4.00001 The effects of orientation on the shock induced microstructure of single crystal tantalum**, GLENN WHITEMAN, Atomic Weapons Establishment, BO PANG, University of Birmingham, JEREMY MILLETT, Atomic Weapons Establishment, YU-LUNG CHIU, IAN JONES, University of Birmingham —

**9:30AM Y4.00002 Shock Compression of Molybdenum Single Crystals to High Stresses**, TOMOYUKI ONIYAMA, Division of Engineering and Applied Science, California Institute of Technology, YOGENDRA GUPTA, Institute for Shock Physics, Washington State University, GURUSWAMI RAVICHANDRAN, Division of Engineering and Applied Science, California Institute of Technology —

**9:45AM Y4.00003 Dynamic Strength Properties of Single Crystal Iron<sup>1</sup>**, SARAH A. THOMAS, ROBERT S. HIXSON, Mission Support and Test Services, BRANDON M. LALONE, GERALD D. STEVENS, WILLIAM D. TURLEY, Special Technologies Laboratory —

<sup>1</sup>This work was done by Mission Support and Test Services, LLC, under Contract No. DE-NA0003624, with the U.S. Department of Energy and supported by the Site-Directed Research and Development Program. DOE/NV/03624-0377.

**10:00AM Y4.00004 Orientation dependent mechanical behavior of shocked AMX602 Mg alloy**, SCOTT TURNAGE, CHAD HORNBUCKLE, CYRIL WILLIAMS, KRISTOPHER DARLING, US Army Rsch Lab - Aberdeen —

**10:15AM Y4.00005 Pressure-Shear plate impact experiments of Magnesium at high pressures.**, SURAJ RAVINDRAN, ZEV LOVINGER, CHRISTIAN KETTENBEIL, MICHAEL MELLO, GURUSWAMI RAVICHANDRAN, California Institute of Technology —

**10:30AM Y4.00006 Diamond Single Crystals Shocked to Multi-Megabar Stresses: Anisotropy and Deformation<sup>1</sup>**, Y. M. GUPTA, Washington State University, M. D. KNUDSON, Washington State University/Sandia National Laboratories, J. M. WINEY, Washington State University —

<sup>1</sup>Work supported by DOE/NNSA and the Sandia Z Fundamental Science Program

**Friday, June 21, 2019 9:15AM - 10:45AM —**

**Session Y5 TMS: Modeling Thermal Response of Materials** Galleria North - David Kittel, SNL

**9:15AM Y5.00001 Aqueous Glycine Condensation Chemistry Under Extreme Conditions<sup>1</sup>**, NIR GOLDMAN, MATTHEW KROONBLAWD, Lawrence Livermore Natl Lab —

<sup>1</sup>Prepared by LLNL under Contract DE-AC52-07NA27344.

**9:30AM Y5.00002 A reactive molecular dynamics study of phenol and phenolic polymers in extreme environments<sup>1</sup>**, KEITH A. JONES, J. MATTHEW D. LANE, NATHAN W. MOORE, Sandia National Laboratories —

<sup>1</sup>Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energys National Nuclear Security Administration under contract DE-NA0003525.

**9:45AM Y5.00003 Microstructure evolution of reactive powder mixtures during shock compression via two-point correlation functions<sup>1</sup>**, MANNY GONZALES, Materials and Manufacturing Directorate, Air Force Research Laboratory, WPAFB, OH 45433, AUSTIN GERLT, Materials and Processes Division, UES, Inc. Dayton, OH 45432, ADAM PILCHAK, ERIC PAYTON, REJI JOHN, MICHAEL UCHIC, SHELDON SEMIATIN, Materials and Manufacturing Directorate, Air Force Research Laboratory, WPAFB, OH 45433 —

<sup>1</sup>The support of the Air Force Office of Scientific Research (Martin Schmidt, Program Officer), through Lab Task Number 18RXCOR042, is gratefully acknowledged.

**10:00AM Y5.00004 Modeling Pyrotechnic Explosions**, ALLEN KUHL, DAVID GROTE, Lawrence Livermore Natl Lab —

**10:15AM Y5.00005 Afterburn modeling of nanothermite composites**, SERENE CHAN, Nanyang Technological University, SUCESKA MUHAMED, University of Zagreb, QINGLING ZHANG, KWEE LIANG YEO, HUEY HOON HNG, Nanyang Technological University —

**10:30AM Y5.00006 Simulations of the structure, vibrational spectra, and energy content of crystalline bis (4-amino-3,5-dinitropyrazolyl) methane under high pressures.**, ISKANDER G. BATYREV, JONNATHAN C. BENNION, JENNIFER A. CIEZAK-JENKINS, US Army Rsch Lab - Aberdeen —

**Friday, June 21, 2019 9:15AM - 10:45AM —**

**Session Y6 SMGPB: Soft Materials I** Galleria South - Peter Gould, Qinetiq



**9:15AM Y6.00001 Dynamic Strength Measurements in Polymethylmethacrylate (PMMA)** , JENNIFER JORDAN, Los Alamos National Laboratory —

**9:45AM Y6.00002 ABSTRACT WITHDRAWN** —

**10:00AM Y6.00003 Dynamic Strength and Friction Behavior of Thermosetting Polyurethane and Epoxy**<sup>1</sup> , PETER SABLE, Marquette University, CHRISTOPHER NEEL, Air Force Research Laboratory, Munitions Directorate, JOHN BORG, Marquette University —

<sup>1</sup>Funded by the Science, Mathematics, and Research for Transformation Scholarship

**10:15AM Y6.00004 Extension of the window correction for Kel-F 800: a near-impedance matched window for high explosives** , LLOYD GIBSON, DANA DATTELBAUM, JOHN LANG, JUSTIN JONES, ANDREW HOULTON, BRIAN BARTRAM, Los Alamos National Laboratory —

**10:30AM Y6.00005 Mechanical and optical response of polymethylpentene under dynamic compression**<sup>1</sup> , L. M. BARMORE, M. D. KNUDSON, Washington State University —

<sup>1</sup>Work supported by DOE/NNSA

**Friday, June 21, 2019 11:00AM - 12:30PM** —  
Session Z1 DSIC: Detonation Tests Grand Ballroom I - Kevin McNesby, ARL

**11:00AM Z1.00001 Disc Acceleration Experiments for Blends of High Explosive Composites** , ROBERT REEVES, BRADLEY WHITE, ERIC BUKOVSKY, MARCOS CHAOS, DENIS RICHARD, Lawrence Livermore Natl Lab —

**11:15AM Z1.00002 The Effect of Confiner Concentricity on Cylinder Test Results** , ERIC ANDERSON, SCOTT JACKSON, VON WHITLEY, Los Alamos National Laboratory —

**11:30AM Z1.00003 Measurement of Composition B Detonation Performance above the TNT Melting Point**<sup>1</sup> , RITCHIE CHICAS, ERIC ANDERSON, SCOTT JACKSON, Los Alamos National Laboratory —

<sup>1</sup>USDOE

**11:45AM Z1.00004 Evaluating Mixing Length Scale using Coaxial Explosive Composites** , MICHAEL GRAPES, BRADLEY WHITE, KEO SPRINGER, DENIS RICHARD, ROBERT REEVES, Lawrence Livermore National Lab —

**12:00PM Z1.00005 Progress made on measuring the temperature of four different detonating explosives.** , JAMES FERGUSON, JAMES RICHLEY, BEN SUTTON, SIMON FINNEGAN, MIKE GOFF, DAN THOMAS, Atomic Weapons Establishment —

**12:15PM Z1.00006 Time resolving the loss of crystallinity during detonation**<sup>1</sup> , PAMELA BOWLAN, DENNIS REMELIUS, DAVE OSCHWALD, NATALYA SUVOROVA, BRYAN HENSON, LAURA SMILOWITZ, Los Alamos National Laboratory —

<sup>1</sup>This research was supported by the Laboratory Directed Research and Development program of Los Alamos National Laboratory under project number 20180597ECR.

**Friday, June 21, 2019 11:00AM - 12:30PM** —  
Session Z2 TMS: Mesoscale Explosive Initiation V Grand Ballroom II - Avinash Dongare, UCONN

**11:00AM Z2.00001 A unified view of burn models for energy localization due to hotspot ignition and growth in shocked energetic materials** , H. S. UDAYKUMAR, SANGYUP LEE, NIRMAL RAI, University of Iowa, ANGELA DIGGS, BARRETT HARDIN, AFRL-RW —

**11:15AM Z2.00002 Multi-scale modeling of the shock response of energetic materials: Comparing HMX and TATB** , ANAS NASSAR, NIRMAL KUMAR RAI, OISHIK SEN, H. S. UDAYKUMAR, University of Iowa, UNIVERSITY OF IOWA TEAM —

**11:30AM Z2.00003 Establishing structure-property-performance linkages for energetic materials**, SIDHARTHA ROY, OISHIK SEN, NIRMAL RAI, MIN-YEONG MOON, KYUNG CHOI, University of Iowa, CHRISTOPHER MOLEK, ERIC WELLE, ANGELA DIGGS, DAVID HARDIN, Air Force Research Laboratory, H S UDAYKUMAR, University of Iowa —

**11:45AM Z2.00004 Three-dimensional Microstructure-explicit and Void-explicit Mesoscale Simulations of the Detonation of HMX<sup>1</sup>**, DANIEL OLSEN, CHRISTOPHER MILLER, YAOCHI WEI, MIN ZHOU, Georgia Institute of Technology —

<sup>1</sup>This work is primarily supported by the Sandia LDRD AA program and partly supplemented by an AFOSR project (Dr. Martin Schmidt). CM also acknowledges support from the NNSA SSGF Fellowship program.

**12:00PM Z2.00005 Mesoscale microstructure-explicit simulations for predicting the ignition thresholds of polymer-bonded explosives<sup>1</sup>**, YAOCHI WEI, JU HWAN SHIN, CHRISTOPHER MILLER, MIN ZHOU, Georgia Institute of Technology —

<sup>1</sup>This work is supported by the AFOSR (Dr. Martin Schmidt).

**12:15PM Z2.00006 Hotspot formation due to crack in HMX crystals<sup>1</sup>**, CHUNYU LI, ALEJANDRO STRACHAN, Purdue Univ —

<sup>1</sup>This work was supported by the US Office of Naval Research, Multidisciplinary University Research Initiatives (MURI) Program, Contract: N00014-16-1-2557.

**Friday, June 21, 2019 11:00AM - 12:30PM —**

**Session Z4 MS: Shock Response of Metals** Pavilion West - Ellen Cerreta, Los Alamos National Laboratory

**11:00AM Z4.00001 Constitutive Response of S65 Beryllium**, JAMES TURNER, JEREMY MILLETT, AWE Aldermaston, Reading, Berkshire, RG7 4PR, CARL CADY, SHUH-RONG CHEN, Los Alamos National Laboratory, Los Alamos, NM 87545, SIMON CASE, AWE Aldermaston, Reading, Berkshire, RG7 4PR —

**11:15AM Z4.00002 Shock Compression of Iridium<sup>1</sup>**, CHRISTOPHER SEAGLE, WILLIAM REINHART, SCOTT ALEXANDER, JUSTIN BROWN, JEAN-PAUL DAVIS, Sandia National Laboratories —

<sup>1</sup>Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

**11:30AM Z4.00003 Dynamic Behavior of Polycrystalline Metals Under Combined Compression and Shear Impact Loading at Elevated Temperatures<sup>1</sup>**, VIKAS PRAKASH, BRYAN ZUANETTI, TIANXUE WANG, Case Western Reserve University —

<sup>1</sup>U.S. Department of Energy through the Stewardship Science Academic Alliance (DE-NA0001989 and DE-NA0002919)

**11:45AM Z4.00004 Scaling and characterization of steady waves in model Tungsten-Polymer Composites**, ROGER MINICH, DAVID BOBER, MUKUL KUMAR, Lawrence Livermore Natl Lab —

**12:00PM Z4.00005 Shock Behavior of Galfenol**, JAMES CAZAMIAS, U.S. Army Research Laboratory, BRIAN WILMER, SURVICE Engineering, SCOTT TURNAGE, CYRIL WILLIAMS, U.S. Army Research Laboratory —

**12:15PM Z4.00006 Anisotropic shock response of single-crystalline  $\beta$ -phase tin**, ROBERT SCHARFF, Nevada National Security Site, New Mexico Operations, Los Alamos, New Mexico 87544, GERALD STEVENS, BRANDON LA LONE, WILLIAM TURLEY, Nevada National Security Site, Special Technologies Laboratory, Santa Barbara, California 93111, SARYU FENSIN, DARBY LUSCHER, Los Alamos National Laboratory, Los Alamos, New Mexico 87545 —

**Friday, June 21, 2019 11:00AM - 11:45AM —**

**Session Z5 TMS: Simulation of Porous and Granular Materials** Galleria North - Travis Sjostrom, LANL

**11:00AM Z5.00001 Validation of High-Resolution Calculations to Inform Continuum Model Development**, GARRY MASKALY, Los Alamos National Laboratory —

**11:15AM Z5.00002 Mesoscale simulations of shock-induced melting in aluminum powder<sup>1</sup>** , BRIAN DEMASKE, MATTHEW HUDSPETH, Sandia National Laboratories, ANIRBAN MANDAL, BRIAN JENSEN, Los Alamos National Laboratories, TRACY VOGLER, Sandia National Laboratories —

<sup>1</sup>Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

**11:30AM Z5.00003 Particle resolved simulations of a shock passing through a bed of spherical particles<sup>1</sup>** , YASH MEHTA, University of Florida, Los Alamos National Laboratory, THOMAS L. JACKSON, SIVARAMAKRISHNAN BALACHANDAR, University of Florida, JONATHAN REGELE, XCP-4, Los Alamos National Laboratory —

<sup>1</sup>This work was supported by the U.S. Department of Energy, National Nuclear Security Administration, Advanced Simulation and Computing Program, as a Cooperative Agreement under the Predictive Science Academic Alliance Program.

**Friday, June 21, 2019 11:00AM - 12:30PM —**

**Session Z6 SMGPB: Soft Materials II** Galleria South - Jennifer Jordan, Los Alamos National Laboratory

**11:00AM Z6.00001 Temperature Effects on Dynamic Response of a Simple Polymer Structure<sup>1</sup>** , WILLIAM PROUD, Institute of Shock Physics, Imperial College London, DAVID SORRY, Institute of Shock Physics and Faculty of Medicine, Imperial College London, GARETH TEAR, Institute of Shock Physics, Imperial College London, THE ROYAL BRITISH LEGION CENTRE FOR BLAST INJURY STUDIES, IMPERIAL COLLEGE LONDON COLLABORATION —

<sup>1</sup>Imperial College London, AWE and the Royal British Legion are acknowledged for their support of this research

**11:15AM Z6.00002 A tensile split Hopkinson pressure bar for low impedance materials** , DAVID WILLIAMSON, University of Cambridge —

**11:30AM Z6.00003 Low and high strain rate compressive properties and aging study of Sylgard 184 with varying amounts of plasticizer and crosslinker** , TOMISLAV KOSTA, THOMAS KRAWIETZ, JESUS MARES, United States Air Force Research Laboratory, Munitions Directorate —

**11:45AM Z6.00004 Time and Temperature Dependent Adhesion in Viscoelastic Materials** , LEWIS LEA, NICHOLAS TAYLOR, DAVID WILLIAMSON, University of Cambridge —

**12:00PM Z6.00005 Generation and propagation of shock wave trains in free liquid jets.** , CLAUDIU STAN, Rutgers University, Newark, GABRIEL BLAJ, SLAC National Accelerator Laboratory, PHILIP WILLMOT, Paul Scherrer Institut, MENGNING LIANG, JASON KOGLIN, ANDREW AQUILA, JOSEPH ROBINSON, RAYMOND SIERRA, SBASTIEN BOUTET, SLAC National Accelerator Laboratory —

**12:15PM Z6.00006 Modeling of an advanced wedge test** , CHRISTOPHER ROMICK, Eureka Physics, TARIQ ASLAM<sup>1</sup>, CINDY BOLME<sup>2</sup>, KYLE RAMOS<sup>3</sup>, Los Alamos National Laboratory —

<sup>1</sup>Theoretical Division, Physics and Chemistry of Materials Group (T-1)

<sup>2</sup>Explosive Science and Shock Physics Division, Shock and Detonation Physics Group (M-9)

<sup>3</sup>Explosive Science and Shock Physics Division, High Explosives Science and Technology Group (M-7)

Abstract Submitted  
for the SHOCK19 Meeting of  
The American Physical Society

Sorting Category: 09.04 (E)

**Electrically stimulated high speed microjet for medical applications** HWI-CHAN HAM, JACK YOH, Seoul National University — Painless needle-free drug injection can be realized using the principle of energy focusing into an infinitesimal area with underwater spark discharge. The power supply unit charges the capacitor with the energy of 2.2 J, thereby releasing the charged energy upon the focusing point of the water chamber. Consequently, joule heating of the water by dielectric breakdown phenomenon generates the cavitation bubbles, and the liquid drug is accelerated to the speed of sound, being ejected out from a micro sized orifice. The resulting microjet speed of 350 m/s within the response time of 10 s is reached. This fast response time enables the micro volume of liquid jet to penetrate the skin epidermis. We build the rapid repetition cycle of spark discharging so that the device injects microliters of drug at the rate of 10 20 shots per second, thereby the injection volume is controlled. The equivalent power consumption is 60 watts. The device replaces the previously developed laser-driven injector that requires 2200 watts at a much higher cost of operation [Park, et al., Er:YAG laser pulse for small dose splashback-free microjet transdermal drug delivery, *Optics Letters*, 37(18), pp. 3894-3896, (2012)]

- Prefer Oral Session  
 Prefer Poster Session

Date submitted: 26 Feb 2019

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