# WEDNESDAY 4/5

| 8:00 | Registration and Breakfast – West Foyer | | | |
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| 8:45 | Welcome and Opening Remarks: Ryan Hurley, Conference Chair – Fitzgerald B & C | | | |
| 9:00 | Plenary Lecture: David Van Wie "Material Challenges in the Hypersonic Environment" – Fitzgerald B & C | | | |
| 10:00 | Coffee Break – North Foyer | | | |
| 10:30 | Plenary Lecture: Elizabeth Opila "High Temperature Materials for Hypersonic Vehicle Leading Edge Applications: Thermochemical Stability Considerations" – Fitzgerald B & C | | | |
| 11:30 | Panel Discussion: moderated by Morgan Trexler – Fitzgerald B & C | | | |
| 12:00 | Lunch – Warfields Ballroom | | | |
| | *Fitzgerald A North* <br> *Data-Driven Modeling of Material Deformation and Fracture* | *Fitzgerald A South* <br> *Mechanics and Manufacturing of Architected Materials* | *Fitzgerald B* <br> *Understanding sub-shock impacts on energetic materials: theory and experiment* | *Duncan* <br> *Modeling Heterogeneous Composites Across Length Scales* |
| 1:00-1:20 | Data-driven discovery of computationally complex ceramics for extreme environments (Ghatu Subhash, S. Bavdekar, R. Hennig) | Improving the failure characteristics of structures via bamboo-inspired void patterns (Xiaoheng Zhu, J. Liu, Y. Hua, O. Tertuliano, J. Raney) | Investigating the importance of chemical and physical properties of explosives in drop-weight impact testing (Virginia Manner, M.Cawkwell, M. Zecevic, J. Moore, N. Lease, R. Cheng) | Homogenization of Elastic and Fracture Properties of Additively Manufactured Ceramics by Statistical Volume Elements (Reza Abedi, M.R. Anamagh, G. Hyunh, A. Amirkhizi, C. Hansen, F. Pourkamali-Anaraki) |
| 1:20-1:40 | | Reduced order modeling of cellular resonator-based mechanical metamaterials under impact and GA-based parameter extraction (Alireza Amirkhizi, W. Cheney, W. Wang, E. Caliskan, R. Abedi) | | Volume-constrained micromorphic homogenization of viscoelastic viscoplasticity in viscous-binder-bonded particulate materials (Eric Bryant, N. Miller, K. Bennett) |
| 1:40-2:00 | Improvement of the mechanical characteristics of impact-resistant and ultrahightemperature boride- and carbide-based ceramic composites and developing an algorithm for computer simulation of the conditions of penetration of armor protection structural elements from these materials (Tetiana Prikhna, B. Karpinos, V. Kulish, A. Lokatkina, R. Haber) | Accelerating multiscale modeling of architected lattices via surrogate models (Joshua Crone, J. Knap, R. Becker) | Characterization of Impact Induced Reaction of Explosives Using the AFRL High Explosive Survivability Test (HEST) (Jesus Mares, S. Thornton, M. Nixon, M. Neidigk) | Role of heterogeneities on local stresses and strains in concrete using x-ray computed tomography imaging, 3D x-ray diffraction measurements and mesoscale simulations (Mohmad Mohsin Thakur, R. Hurley) |
| 2:00-2:20 | Development of Deep-Network Learned Interatomic Potential for Shock Simulations of B4C (Kimia Ghaffari, S. Bavdekar, G. Subhash, D. Spearot) | Design of failure-resistant architected materials via distributed agents (Jiakun Liu, X. Zhu, W. Gosrich, M. Yim, J. Raney) | Prediction of Probabilistic Ignition Thresholds of Energetic Materials Through Evolution of Thermal-Mechanical Dissipation and Reactive Heating (Daniel Olsen, Y. Wei, M. Zhou) | Bridging the Nano- to Meso-scales for Microstructural Modeling of Ceramic Composites (Matthew Guziewski, J. Clayton, P. Goins) |
| 2:20-2:40 | Effects of crystallography on hot-spot formation in porous RDX single crystals (Justin Wilkerson, B. Ravaji) | Architected materials with effective water intake, storage, and release properties inspired by the feathers of namaqua sandgrouse (Pterocles namaqua) (Jochen Mueller, L. Gibson) | Constitutive Modeling of Molecular Crystal HMX: Strain Rate Sensitivity, Pressure Sensitivity and Localization (Catalin Picu, M. Khan, Z. Zhang) | An Analytical, Multiscale Model for Predicting Granular Elasticity Incorporating Force Chain Mechanics (Adyota Gupta, K.T. Ramesh, R. Hurley) |

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| 2:40-3:00 | Data-driven modeling of fracture response of heterogeneous material fields to dynamic loading (Farhad Pourkamali-Anaraki, G. Hyunh, R. Abedi, A. Amirkhizi, C. Hansen) | | |
| 3:00-3:30 | **Coffee Break – North Foyer** | | |
| | *Fitzgerald A North*<br>*Data-Driven Modeling of Material Deformation and Fracture* | *Fitzgerald A South*<br>*Mechanics and Manufacturing of Architected Materials* | *Fitzgerald B*<br>*Understanding sub-shock impacts on energetic materials: theory and experiment* | *Duncan*<br>*Modeling Heterogeneous Composites Across Length Scales* |
| 3:30-3:50 | Learning macroscopic internal variables and history dependence from microscopic models (Burigede Liu) | Hierarchical Design of Ceramic Composite Laminates (Matthew Guziewski, N. Ku, T. Moore, J. Swab, K. Behler, J. LaSalvia) | Use of Hopkinson pressure bars for the quantitative study of impact initiation in secondary high explosives (David M. Williamson, O. Morley, P.J.S. McMaster) | Impact damage modeling of a woven composite lamina using the microplane triad model (Kedar Kirane, J. Ochilov, T. Abdullah) |
| 3:50-4:10 | Accelerated machine learning framework for brittle crack problems using transfer learning and graph neural networks (Roberto Perera, V. Agrawal) | On the effect of topology on the shock dynamics of architected materials (Stavros Gaitanaros, S. Luan, J. Guest) | | Mechanics of glassy polymers: understanding and modeling the creep response (Martin Roman-Faure, H. Montes, F. LeQueux, A. Chateauminois) |
| 4:10-4:30 | Characterizing Severity of Barely Visible Impact Damage (BVID) with Machine Learning (Sai Tharun Badabagni, R. Talreja) | A reduction-based method for modelling Lattice Materials (Yash Agrwal, J. Guest) | Multiscale Temperature Measurements in Shocked High Explosives Using Raman Thermometry (Belinda Pacheco, S. McGrane, J. Lang, C. Bolme, K. Ramos) | Ranking Silane Molecules for Interphase Performance In S-Glass/Epoxy Composites (Abhishek Bhesania, M. Benvenuto, M. Munetaka, S. Chowdhury, J. Gillespie) |
| 4:30-4:50 | A first principles informed machine learning model for electronic structure prediction of strained 1D nanomaterials (Amartya Banerjee) | A Data-Driven Framework for Structure-Property Correlation in Ordered and Disordered Cellular Metamaterials (Shengzhi Luan, E. Chen, S. Gaitanaros) | Modeling of large scale plastic deformation during VIPIR experiment (Milovan Zecevic, M. J. Cawkwell, R. M. Cheng, J. D. Moorez, V. W. Manner) | Multiscale Modeling of Regenerated Bone (Kevin Hoffseth) |
| 4:50-5:10 | Investigation of non-shock initiation of munitions (Gert Scholtes, S. de Koster) | Linear and Nonlinear Time Domain Analysis of Resonant Metamaterials under Impact Loading (Erdem Caliskan, W. Cheney, W. Wang, R. Abedi, A. Amirkhizi) | PBX9502: Connecting 3D Microstructure to Sub-shock Detonation using X-ray Phase Contrast Imaging (Andrew Leong, B. Zuanetti, M. Zecevic, K. Ramos, C. Bolme) | Comparison of Mesoscale Deformation in a Stochastic Carbon Fiber Material Under Uniaxial and Complex Stress States (R. Nicholaus Quammen, P.F. Rottmann) |
| 5:10-5:30 | | | | Perforation Mechanics of Thin Section Dyneema HB210 Hard Ballistic Soft Laminates (Bazle Haque) |
| 5:45 7:15 | **Poster Session / Reception – Warfields Ballroom** | | |

# THURSDAY 4/6

| 8:30 | **Breakfast – Warfields Ballroom** |
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| 9:00 | **Plenary Lecture: Laura Pyrak-Nolte "The Formation & Function of Fracture Geometry in Rocks" – Fitzgerald B & C** |
| 10:00 | **Coffee Break – North Foyer** |
| 10:30 | **Plenary Lecture: Amine Benzerga "Recent Advances in Modeling Porous Material Plasticity" – Fitzgerald B & C** |
| 11:30 | **Panel discussion moderated by Shailendra Joshi – Fitzgerald B & C** |
| 12:00 | **Lunch – Warfields Ballroom** |

|  | *Fitzgerald A North*<br>*Slip, Twins and Voids* | *Fitzgerald A South*<br>*Learning, Uncertainty, and Materials* | *Fitzgerald B*<br>*High strain rate mechanics of heterogeneous and porous materials* | *Duncan*<br>*Systems for Fitting, Uncertainty Quantification, Selection and Use of Interatomic Models* |
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| 1:00-1:20 | Plasticity and damage micro-mechanisms in a high-strength ($\alpha+\beta$) titanium alloy (Cem Tasan, M. Cooper, S. Wei) | NeuralUQ: A comprehensive library for uncertainty quantification in neural differential equations and operators (Zongren Zou, X. Meng, A. Psaros, G. Karniadakis) | Tesile Shock-Induced Spallation In Monocrystalline Boron Carbide (Ghatu Subhash, A. Adoor) | Thermodynamic stability predictions in the context of accelerated materials discovery (Chris Bartel) |
| 1:20-1:40 |  | Reconstruction of 3D microstructures from 2D images using a gradient-based sequential optimization approach (Ashwini Gupta, N. Wade, L. Graham-Brady) | Shear Strength Relaxation and Recovery in Shock-Loaded Granular Materials (Michael Homel, E. Herbold) | Accelerating Unique Materials Discovery with Automatic Structural Analysis and Prototype Generation Tools (David Hicks, C. Oses, M. Esters, M. Mehl, C. Toher S. Curtarolo) |
| 1:40-2:00 | The spall and anomalous inelastic response of Galfenol to shock loading (Cyril Williams) | Variational Onsager Neural Networks (VONNs): A thermodynamics-based variational learning strategy for non-equilibrium material modeling (Shenglin Huang, Z. He, B. Chem, C. Reina) | Mesoscale shock structure in particulate composites (Suraj Ravindran, V. Gandhi, B. Lawlor, G. Ravichandran) | Reproducible high-fidelity molecular simulation through OpenKIM (Ellad Tadmor) |
| 2:00-2:20 | A crystal plasticity model for the pressure dependence of single crystal spall strength (Justin Wilkerson, T. Nguyen, D.J. Luscher) | Machine Learning for Material Designs (Wensi Wu, L. Lu) | Spall strength of polycarbonate measured using laser-driven micro-flyer impact experiments (Jacob M. Diamond, K.T. Ramesh) | TUTORIAL: The openkim.org repository, property testing framework, and KIM models (Ilia Nikiforov) |
| 2:20-2:40 | Deformation-Induced Modification of Phase Transformation Pathways in Metallic Systems (Bharat Gwalani) | Learning Dynamics with Adaptive Random Fourier Features (Jerome Troy, P. Plechac, G. Simpson) | Energy-absorbing properties of additively manufactured metallic cellular materials (Marlini Simoes) |  |
| 2:40-3:00 | Plastic slip and phase transitions and in ferrous metals under magnetic fields (John Clayton, H. Murdoch, J. Lloyd, D. Magagnosc, D. Field) |  | Gas gun driven dynamic expansion of 3D-printed rings (Thomas Virazels, J.C. Nieto-Fuentes, N. Jacques, J.A. Rodriguez-Martinez) |  |
| 3:00 | **Coffee Break – North Foyer** | | | |

| | Fitzgerald A North<br>*Hypervelocity Impact Phenomena* | Fitzgerald A South<br>*Learning, Uncertainty, and Materials* | Fitzgerald B<br>*High strain rate mechanics of heterogeneous and porous materials* | Duncan<br>*Systems for Fitting, Uncertainty Quantification, Selection and Use of Interatomic Models* |
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| 3:30-3:50 | Anisotropic behavior of AZ31B Magnesium under hypervelocity impact (YunHo Kim, G. Simpson, D. Magagnosc, L. Kecskes, J.T. Lloyd K.T. Ramesh) | Quantifying Stiffness Reduction in Composite Laminates with Delamination Damage using Lamb Waves (Sai Tharun Badabagni, R. Talreja) | Modeling Dynamic Formability of Porous Ductile Sheets Subjected To Biaxial Stretching: Actual Porosity Versus Homogenized Porosity (José Rodríguez-Martínez, J. Nieto-Fuentes, N. Jacques, M. Marvi Mashhadi, K. N'souglo) | pyiron an integrated development environment for the development and assessment of interatomic models (Jan Janssen, D. Perez) |
| 3:50-4:10 | Fragmentation Characteristics of Swaged Powder Compacts under High-Velocity Projectile Impact (Gary Simpson, J. Grant, T. Weihs, K.T. Ramesh) | A high-throughput constitutive model calibration workflow for crystal plasticity finite element model (Anh Tran, P. Robbe, H. Lim) | A multisurface theory of ductile fracture for rate-dependent solids. (Vigneshwaran Radhakrishnan, A. Benzerga) | Injecting Domain Knowledge from Empirical Interatomic Potentials to Neural Networks for Predicting Material Properties (Zeren Shui, D. Karls, M. Wen, I. Nikiforov, E. Tadmor, G. Karypis) |
| 4:10-4:30 | The Influence of Geometric Scale on High-Velocity Impact Phenomena: From Micro- to Macro-Scale (Jacob Rogers, K. Xiao, H. Eoh, J. Wilkerson, T. Lacy E. Thomas) | Learning-Based Optimal Uncertainty Quantification and Its Application to Ballistic Impact Problems (Xingsheng Sun, B. Liu) | Dynamic Ductile Damage in Tantalum: a Numerical Study of Explicit Void Growth at Mesoscale (Thao Nguyen, D.J. Luscher) | ColabFit: Integrated framework for the development of machine learning interatomic potentials (Stefano Martiniani, E. Tadmor, R. Elliot, J. Vita, A. Gupta, E. Fuemmeler) |
| 4:30-4:50 | Hypervelocity Impact Performance Polymer Coated Ballistic Fabric Back Bumper (Sarath Kumar Sathish Kumar, Y. Kim, J.H. Seok) | Integrated Machine-Learning Framework and Multiphysics Simulations for Rapid Exploration of High-dimensional Microstructure-Property Relations (Ozge Ozbayram, A. Venkatraman, W.T. Ragan, M. Zhou, L. Graham-Brady, S.R. Kalidindi) | A multi-mechanism model for fluid-saturated, brittle granular materials during high-velocity impact events (Aaron Baumgarten, N. Mitra, R. Hurley, K.T. Ramesh) | A Tutorial Introduction to developing and deploying machine learning interatomic potentials using KLIFF (Amit Gupta) |
| 4:50-5:10 | High-throughput Characterization of Spall Strength of Niobium (Arezoo Zare, J. Diamond, KT Ramesh) | Stochastic hierarchical multiscale and surrogate modeling of heterogenous materials (Georgios Soimoiris) | Pressure, Temperature and Pre-strain History Dependent Dynamic Flow and Failure of Porous Syntactic Foam (LongHui Zhang, D. Townsend) | |
| 5:10-5:30 | Hypervelocity Impact in NASA's DART mission (Nilanjan Mitra, S. Ghosh, K.T. Ramesh) | Learning uncertainty-aware models of defect kinetics in discrete and continuous state spaces (Thomas Swinburne, D. Perez) | In-situ high-energy X-ray characterization of dynamic shear localization and fracture of additively-manufactured metallic materials (Juan Carlos Nieto-Fuentes, J.A. Rodriguez-Martinez, A. Cohen, A.R. Vishnu, J. García-Molleja, F. Sket) | |
| 5:30 | **Reception – West Foyer** | | | |
| 6:30 | **Conference Banquet – Warfields Ballroom**<br>**Banquet Speaker: Jenna Frye** | | | |

# FRIDAY 4/7

| Time | | | | |
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| 8:30 | **Breakfast – Warfields Ballroom** | | | |
| 9:00 | **Plenary Lecture and Discussion: Aaron Stebner "Best Practices in Using Machine Learning in Materials, Mechanics, and Manufacturing Research" Moderated by Mitra Taheri – Fitzgerald B & C** | | | |
| 10:00 | **Coffee Break – North Foyer** | | | |
| | *Fitzgerald A North* *Slip, Twins and Voids* | *Fitzgerald A South* *Mechanics of Biological and Biomimetic Soft Materials* | *Fitzgerald B* *Multi-scale Modeling, Characterization, Processing, and Performance of UHMWPE Fibers and their Composite Laminates* | *Duncan* *Systems for Fitting, Uncertainty Quantification, Selection and Use of Interatomic Models* |
| 10:30-10:50 | High-Throughput, Small Scale Fracture Investigations at the Extremes (Christos Athanasiou) | Fatigue Damage on the Spine from Repetitive High Magnitude Loads seen by Pilots (Ann Reyes Kadozono, R. Kraft) | Using the Embedded Element Finite Element Method to Simulate Impact of Dyneema Plates (Valerie Martin, V. Martin, T. Hannah, R. Kraft, S. Ellis) | Uncertainty Quantification and Sloppy Models in Atomistic Simulations (Mark Transtrum) |
| 10:50-11:10 | | An investigation of the influence of the tentorium and brainstem on intracranial displacements and strain within a closed headform (Sheng Xu, S. Ouellet, A. Azar, O. Petel) | Experimental and numerical simulations on oblique impact into pressed and unpressed targets consisting of cross-plied sheets of UHMWPE fiber in different polymer matrices (Harm van der Werff, S. Leigh Phoenix, U. Heisserer) | Uncertainty quantification toolbox for OpenKIM (Yonatan Kurniawan, M. Transtrum) |
| 11:10-11:30 | Shape-Morphing Metallic Components (Gianna Valentino) | The response of lung tissue to direct impact trauma (MacKenzie Brannen, R. Banton, J. Clayton, O. Petel) | Tailoring Fiber Architecture to Improve the Impact Performance of UHMWPE Composites. (Steven E. Boyd, J. Staniszewski, T. Bogetti) | Reliable molecular simulations using uncertainty-quantified machine learning potentials (Mingjian Wen) |
| 11:30-11:50 | Modeling Plasticity Contributions from Dislocation Slip, Twinning, and Phase Transformation Behavior in BCC metals (Avinash Dongare) | Response of Bacteria Subjected to Extreme Dynamic Stresses (Lily Zhao, C. Perez-Fernandez, J. DiRuggiero, K.T. Ramesh) | Penetration Mechanics of Thick Section Dyneema HB210 Hard Ballistic Soft Laminates (Bazle Haque) | Augmenting Reverse Monte Carlo with machininteratomic potentials and uncertainty quantificatione learning (Paul Cuillier, Y. Zhang) |
| 11:50-12:10 | Metallurgical Metamaterials: A strategy for manipulating shock waves using metallurgy (Jeffrey Lloyd, Daniel Field, D. Magagnosc, B. Fagin, S. Turnage, C. Williams) | Fracture and Toughness of Soft Network Materials: Damage Accumulation and Controlling Structural Parameters (Catalin Picu, S. Jin, S. Deogekar) | Pressure Distribution During UHMWPE Processing of Complex-Curvature Parts (Michael Yeager, J. Staniszewski, T. Bogetti) | Enabling molecular dynamics simulations of helium bubble formation in tritium-containing austenitic stainless steels: An Fe-Ni-Cr-H-He potential (Xiaowang Zhou, M. Foster, Ryan Sills) |
| 12:10-12:30 | 3D characterization of shock-induced damage in wrought Ta (Paul Rottmann, T. Francis, A. Polonsky, M. Echlin, G. Gray, T. Pollock) | Physics-Informed Data-Driven Constitutive Modeling of Strain Rate Sensitive Soft Tissues (Kshitiz Upadhyay, J.N. Fuhg, N. Bouklas, K.T. Ramesh) | Effects of Voids on the Transverse Compressive and Axial Tensile Behaviors of Polyethylene Fibrils (Nuwan Dewapriya, S. Chowdhury, J. Gillespie) | Uncertainty in the shear coupling factors of asymmetric tilt grain boundaries – A molecular dynamics study (Nikhil Chandra Admal, H. Joshi, I. Chesser, B. Runnels) |
| 12:30 | **Lunch – Warfields Ballroom** | | | |
| 1:30 | **ADJOURN** | | | |