8th Annual Graduate Research and Discovery Symposium

April 22\textsuperscript{nd} & 23\textsuperscript{rd}, 2020

Hosted By:
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Schedule of Events

All Times in Mountain Daylight Time (MDT)

Wednesday, April 22\textsuperscript{nd}

11:00 AM Keynote Speaker
   Ralph D. Lorenz, Johns Hopkins University
   Viewing of Online Presentations Opens
   Audience Choice Voting Opens

1:00 PM Panel: Diversity, Access & Inclusion in Research

Thursday, April 23\textsuperscript{rd}

9:00 AM Judging of Presentations Opens

5:00 PM Judging & Audience Choice Voting Closes
6:00 PM Announcement of Winners
   \textit{Presented By: President Paul. C. Johnson Ph.D.,}
   \textit{Colorado School of Mines}

\textbf{MinesGRADS}
\textit{Graduate Research And Discovery Symposium @ MINES}
Connecting students to ideas
Virtual Conference: How To Navigate the Online GRADS

Since the early 1990s, the graduate students of the Colorado School of Mines have hosted a conference on campus highlighting research at Mines, known as the Graduate Research and Discovery Symposium (GRADS). In response to the COVID-19 pandemic, Mines is moving to online learning and cancelling public gatherings. In the finest Mines tradition of perseverance through adversity, the Mines Graduate Student Government will be presenting a 100% online, live-streaming GRADS conference.

Presentations will now be featured as pre-recorded videos that are available in our “live” online gallery. The prior poster presentations are now “short-form”, and prior oral presentations are “long form”. All presentations are grouped into various academic and research field “sessions” and judged by panels of professionals in academia, research, and industry.

We are also hosting a Diversity and Inclusion Panel, our featured Keynote speaker, Ralph Lorenz, and an Awards Ceremony as live-streamed events during the conference.

To access all of the events and presentations, please visit our website (https://gsg.mines.edu/grads/) and click the appropriate links listed at the top of the page.

We appreciate your attendance, support and interaction in our unique online conference. Enjoy!
Virtual Conference: How To Navigate the Online GRADS

I want to...

- Check out the RESEARCH presentations!
- WATCH the Keynote Lecture!
- Listen in on the Diversity & Inclusion PANEL!
- See the AWARDS presented!
- VOTE on my favorite presentation!

GO TO: GSG GRADS HOMEPAGE

https://gsg.mines.edu/grads/

Registration is not required for ‘attendance’. Attendees can view the live, virtual panel or keynote presentation, as well as the pre-recorded research presentations. To participate in the “Audience Choice” voting, please sign in/create a FREE account with Youtube to make your vote count.
GRADS Organizing Committee

Maxwell Silver - Chair of Committee
Muthu Vinayak - Keynotes and Workshop
Jason Chenenko - Poster Sessions/Short Form
Malavikha Rajivmoothy - Marketing
Anuradha Khetwal - Social
Daniel Mawhirter - Technology
Nicole Vandaele - Program and Deliverables
Daniel Gaydos - Judges
Natalia Soares Rodrigues - Oral Sessions/Long Form

Comments or questions about our online symposium? 
Email gsgvp@mines.edu
Thank you!
We had very generous donors when initially hosting our in-person symposium on the Colorado School of Mines campus. Since moving the conference online, there was no need for much of our prepared food and drink items. We appreciate Golden’s local breweries for their willingness to donate, and look forward to hosting their creations in future symposiums for the enjoyment of those of legal age.
2019-2020 Graduate Student Government

Executive Officers:
President, Gauen Alexander
Vice President, Maxwell Silver
Treasurer, Rami Abousleiman
Academic Chair, Muthu Vinayak
Social Chair, Anuradha Khetwal
Secretary, Ivy Wu

Representatives:
Advanced Energy Systems, Heather Mirletz & Noah Sandoval
Advanced Manufacturing, TBD
Applied Mathematics and Statistics, Todd Yoder
Chemical and Biological Engineering, Benjamin Appleby
Chemistry, Alison Biery
Civil and Environmental Engineering, VeeAnder Mealing & Patrick Thieringer
Computer Science, Daniel Mawhirter
Economics and Business, Quentin Taillefer
Electrical Engineering, Daniel Gaydos
Geology and Geological Engineering, Miranda Lehman
Geophysics, Dana Sirota
Humanities, Arts & Social Sciences, Cassie Kraft
Hydrology, Nicole Vandaele
Materials Science, Jason Chenenko
Mechanical Engineering, Sydney Holdampf
Metallurgical and Materials Engineering, Malavikha Rajivmoorthy
Mining Engineering, Natalia Soares Rodrigues
Nuclear Science, Jesus Mendoza
Operations Research with Engineering, Peter Nesbitt
Petroleum Engineering, Juan Carratu
Physics, Spencer Fretwell
Quantitative Biosciences and Engineering, Bikram Adhikari
Space Resources, Ross Centers
Underground Construction and Tunneling, Rajat Gandrade

GRADUATE STUDENT GOVERNMENT
COLORADO SCHOOL OF MINES

8
Welcome to the 2020 Graduate Research and Discovery Symposium!

While the online format is different from years past, the research being conducted by our graduate students remains as impressive as ever. I am excited to share it with you – wherever you may be – over the next two days at GRADS.

That we are gathering together at all to celebrate the work of our graduate students is a testament to the Graduate Student Government and their adaptability, innovation and perseverance through adversity. I want to thank GSG for their commitment to this important annual event and to ensuring that Mines continues to move forward in these unprecedented times.

While many of us may not be in our labs right now, it is still an exciting time to be involved in graduate education at Mines. One of our Fryrear Chairs for Excellence and Innovation is hard at work creating a distinctive experience for graduate students, and our campus will soon welcome a full-time dean of graduate studies to provide institution-wide leadership in graduate education and graduate student scholarship.

Stay well and thanks for joining me at the 2020 GRADS.

Richard C. Holz
Provost and Professor
Colorado School of Mines
On behalf of the Colorado School of Mines Graduate Student Government, I would like to welcome you all to the 2020 Graduate Research and Discovery Symposium (GRADS). This semester we have endured indelible trials and tribulations. Yet, in the face of a global pandemic, our communities have shown outstanding unity and resolve. It is thanks to the perseverance of the GRADS 2020 presenters, judges, panelists, and keynote speaker that this symposium occurs. This year we are honored to host over 125 student research presentations representing a wide array of disciplines. We hope you will explore topics outside of your field and stimulate interdisciplinary discussion. It is our goal to facilitate collaboration in our community across disciplines and to encourage students to expand their research spheres.

We are honored to have Dr. Ralph Lorenz be this year’s GRADS keynote speaker. Dr. Lorenz joins us from the Johns Hopkins University Applied Physics Laboratory located in Laurel, Maryland. Please join me in welcoming Dr. Lorenz by attending the live virtual keynote on Wednesday, April 22nd at 11 am. We are also hosting a live virtual panel discussing Diversity and Inclusion in Research also on April 22nd at 1 pm. This workshop promises to be very engaging and we encourage all of you to attend.

GRADS would not be possible without the herculean efforts of the organizing committee (all graduate students): Rami Abousleiman, Jason Chenenko, Daniel Gaydos, Anuradha Khetwal, Daniel Mawhirter, Malavikha Rajivmoothy, Natalia Soares Rodrigues, Muthu Vinayak, and Nicole Vandaele. While transitioning to online courses, stay-at-home isolation, and telecommuted research, they refused to give up on GRADS. It has been my honor to work alongside such fine individuals. We would also like to thank our amazing judges and volunteers who stood by GRADS in these difficult times. GRADS is organized by a team of Mines graduate students. If you would like to help organize GRADS we are always excited to have people join our team. If you are interested, please contact me at gsgvp@mines.edu.

I look forward to seeing you all at the digital symposium,

Maxwell Silver
GRADS Committee Chair
Hydrologic Science and Engineering Ph.D. Student
Saturn's giant moon Titan has been revealed to be remarkably Earth-like, with a landscape of vast dunefields, river channels and lakes under a smoggy sky punctuated by methane downpours. Titan serves as a frigid laboratory in which the same processes that shape our own planet can be seen in action under exotic conditions. Titan has a rich inventory of complex organic molecules that may provide clues how the building blocks of life are assembled. I will review my participation in three countries over 30 years in the epic Cassini-Huygens mission, at Saturn 2004-2017. I will also discuss prospects for future exploration: NASA recently announced the selection of the JHU Applied Physics Lab's Dragonfly concept for the next New Frontiers mission. Dragonfly will launch in 2026, to arrive in 2034: it is a rotorcraft lander, able to repeatedly take off and fly tens of kilometers in Titan's dense atmosphere and low gravity to sample the surface composition in a wide range of geological settings. Initially landing in the dunefields nearby, it will traverse to the 80km Selk impact crater, making geomorphological, meteorological and even seismological investigations over more than 2 years. I will discuss the transformative scientific opportunities of this mission, and some of the technical innovations that make it possible.
Dr. Ralph Lorenz worked as an engineer for the European Space Agency on the design of the Huygens probe to Saturn's moon Titan, and as a planetary scientist at the University of Arizona, and since 2006, at the JHU Applied Physics Lab. His activities have centered on Titan, Cassini-Huygens and future missions there, but his interests include Mars, dust devils, sand dunes, planetary atmospheres and landscapes, and aerospace systems. He is associated with NASA's InSight mission at Mars and the Japanese Venus orbiter Akatsuki, and is the Mission Architect for Dragonfly, NASA's next New Frontiers mission (a rotorcraft lander for Titan). He is the author or co-author of several books including 'Lifting Titan's Veil','Spinning Flight', 'Exploring Planetary Climate' and 'Space Systems Failures', as well as over 300 journal publications.
FEATURED PANEL:

Diversity and Inclusion in Research

**Wednesday, April 22nd, 2020**  
1:00 - 2:00 PM MDT

*To attend, visit GRADS Homepage: [https://gsg.mines.edu/grads/](https://gsg.mines.edu/grads/)*

The panel will explore the impact of diversity and inclusion practices in various avenues of research and discuss the challenges in future.

*Moderated by: Ms. VeeAnder Mealing,* Ph.D. Candidate, Civil and Environmental Engineering, Colorado School of Mines

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**Featuring panelists from academia, industry and research:**

**Dr. Amy Landis**  
Presidential Faculty Fellow For Access, Attainment & Diversity; Professor, Civil And Environmental Engineering, Colorado School of Mines

**Dr. Andria Ellis**  
Education & Community Engagement Specialist, UNAVCO

**Dr. Chris Coulston**  
Head of Advocates Program at Colorado School of Mines; Teaching Associate Professor, Electrical Engineering, Colorado School of Mines

**William Kindred**  
Diversity, Equity and Inclusion Officer at National Renewable Energy Laboratory (NREL)

**Dr. Kaitlin Spak**  
Senior Managing Engineer, Exponent
Sigma Xi, the Scientific Research Honor Society, is the international society of science and engineering. It is one of the oldest and largest scientific organizations in the world, with more than 500 chapters and 100,000+ members.

**Colorado School of Mines Chapter of Sigma Xi is currently seeking nominations for membership!**

**Benefits of Membership include:**
- Excellent resume builder
- Access to research grants
- Subscription to American Scientist
- Opportunities for community outreach
- Access to email briefs of the latest scientific developments
- Access to the Annual Meeting & Student Research Showcase

**How do I become a member?**
⇒ Nomination by Advisor or local Chapter Member
⇒ See [www.sigmaxi.org/members/becoming-a-member](http://www.sigmaxi.org/members/becoming-a-member) for forms & details

For more information, contact Dr. John Trefny (CSM President Emeritus) at [jtrefny@mines.edu](mailto:jtrefny@mines.edu), or visit [www.sigmaxi.org](http://www.sigmaxi.org).
Presenter Awards

Funded by the CSM Graduate Student Government

Prizes have been increased and modified this year as a thank you to our presenters for their patience through this process. Prizes are now formatted as follows:

“Long-form” (Oral) Presenters:
One first-place award will be given for each of the 12 sessions. Each session has a maximum of 7 presenters.
    1st Place: $500 (per session)

“Short-form” (Poster) Presenters:
Two awards will be given for each of the 4 sessions. Each session has 18-20 participants each.
    1st Place: $750 (per session)          2nd Place: $500 (per session)

Audience Choice
As all submissions will be pre-recorded, a new series of ‘audience choice’ awards will be introduced. This will be based on the number of “likes” a submission video receives. The deadline for viewers to “like” a video and contribute to this competition is 5 pm Thursday, April 23.

    1st Place: $1000          2nd Place: $500          3rd Place: $250

Award Ceremony

Presenter: President Paul C. Johnson, Ph.D.
Thursday, April 23rd, 2020       6:00 PM
GRADS Homepage: https://gsg.mines.edu/grads/

Please join us virtually to congratulate all of the presenters for their hard work and dedication to their individual research projects. The selected winners will also be announced LIVE by President Johnson.
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How To Read the Technical Program

Listed Long- and Short- Form Presentations

Access all Presentations from the GRADS Homepage:

https://gsg.mines.edu/grads/

On Thursday, April 23rd starting at 9:00 AM.

**Tunneling and Excavation**


**Presentation Criteria:**

All presentations are pre-recorded and will be uploaded for viewing. They will all follow the same format: voice over/annotated presentation.

⇒ “Long-form” presenters are allotted 10 minutes to present via annotated PowerPoint slides, video lab tour, etc.

⇒ “Short form” presenters are allotted 3 minutes to present via annotated PowerPoint slides, poster display with voice-over, etc.

Some presentations will be available for viewing online after 5 PM on April 23rd depending on student preferences.
Technical Program - Short Form

Computation and Electronics

(1) Cybersecurity Red Team Versus Blue Team to Secure Smart Homes. A. Alshehri
(2) Activity Recognition by Learning from Human and Object Attributes. B. Reily, Q. Zhu, H. Zhang
(4) Dempster-Shafer Theoretic Learning of Indirect Speech Act Comprehension Norms. R. Wen, M. Aun Siddiqui, T. Williams
(5) AWS Cloud Security Continuous Compliance and Auto-Remediation Framework. P. Gangrade
(6) Impact of Placement and Gender in a CS0 Course on Academics and Self-Efficacy. C. Liebe, R. Wen
(7) Quantitative characterization of proppant in unconventional oil and gas reservoirs. K. L. Ngameni, J. Miskimins, A. Newman, S. Bandyopadhyay
(8) Machine Learning Methods for Predicting Well Log Correlations using North Sea Petrophysical Data. A. Al Ghaithi, M. Prasad
(9) Incorporating Nonstationarity into the Multi-Resolution Approximation for Massive Spatial Data. L. Blake, H. Huang, M. Katzfuss, D. Hammerling
(10) A mathematical model of surface-mediated enzyme inhibition under flow. S. Bride, K. Leiderman
(11) Towards a Model of Lipid-Dependent Reactions. J. Corrette, K. Leiderman, M. Kelly
(14) Simulation of a Nonlinear Frequency Multiplier using the Finite-Difference Time-Domain Technique. J. Kast, A. Elsherbeni
(15) Critical Comparison Between Python and MATLAB Performance for Computational Electromagnetics. A. Weiss, A. Elsherbeni
Technical Program - Short Form

Earth Science
(1) Effects and design considerations of thermal gradient loading in immersed concrete tunneling applications. A. Wilson
(2) Applying Social Science Methodologies to Create Community-Based Conceptual Site Models for Mercury Contamination in Artisanal Mining. R. O'Brien, K. Smits, N. Smith
(3) Density Functional Theory can be Combined with Kinetics Experiments to Link PFAS Reactivity to Chemical Structure. C. Amador, V. Shubham, T. Strathmann
(4) Influence of anaerobic oxidation of methane on the precipitation of the seep carbonates of the Moreno Formation, Panoche Hills, California. K. Rasmussen, D. Osorio-Rodriguez, A. Roussel, C. Areias, M. Ingalls, R. Shapiro
(5) Assessing shifts in microbial diversity from meteoric water penetration into a subsurface environment at Edgar Experimental Mine. P. Thieringer, A. Honeyman, J. Spear
(8) Numerical Modeling of Pillar Stress Redistribution during the Retreat Mining Process. R. Dean-Pelikan, G. Walton
(9) Extraterrestrial Fluvial Fans. J. Henry, M. Hansford
(10) Heterogeneous flow paths in the subsurface may explain the lab vs. field weathering rate conundrum. E. Andrews, A. Navarre-Sitchler
(13) Electrical Imaging of Groundwater -Surface Water Exchange due to Logjams and Associated Geomorphological Complexities. S. McFadden, G. Wright, I. Gambill, K. Singha
Technical Program - Short Form

Earth Science (cont.)
(14) Investigating pillar damage mechanisms in context of two case studies using Bonded Block Models (BBMs). S. Sinha, G. Walton
(15) Microtextures of Quartz-Carbonate Veins at the Chatree Epithermal Au-Ag Deposit, Thailand. T. Taksavasu, T. Monecke
(16) 4D Simultaneous PP-PS Prestack Inversion of the Edvard Grieg Oil Field, North Sea. S. Daneshvar
(17) Electromagnetic coupling in direct current-induced polarization surveys. D. Donmez
(18) Correlation or causation: A study of slope failure in the Tuaheni Basin, offshore New Zealand. T. Vick, B. Dugan
(19) How Uncertain Are the Geological-Geotechnical Soil Unit Transition Boundaries? R. Gangrade, M. Mooney

Engineering
(1) Characterization of Irradiation Damage in Advanced Steel Alloys. C. Rietema, A. Clarke, B. Eftink, T. Saleh, K. Clarke
(2) Development of a Computation Cervical Spine Model for Clinical Investigations. C. Crowley, B. Froechtenig
(4) A Distributed Reinforcement Learning Yaw Control Approach for Wind Farm Energy Capture Maximization. P. Stanfel, K. Johnson, C. Bay, J. King
(5) Polarization Reconfigurable Patch Antenna for 5.8 GHz ISM Applications. J. Diener, A. Z. Elsherbeni
(6) A phased array communication system for maximizing drone data link reliability in disaster relief support. P. Moschetti, P. Nayeri
(7) Debye Coefficients for Biological Tissues From 100 MHz to 100 GHz. R. Lumnitzer, A. Tanner, A. Elsherbeni
(8) MPC for wind turbines. S. Kianbakht
(9) A High-Performance Circularly Polarized Antenna Array for Wireless Energy Harvesting Applications. T. Torres, P. Nayeri
(10) Cavity Backed Patch-Slot Antenna for 5G Lower Frequency Band Communications. Y. Chen, A. Elsherbeni
Technical Program - Short Form

Engineering (Cont.)
(11) Arrow Patch-Slot Antenna for 5G Lower Frequency Band Communications. Y. Feng, Y. Chen, A. Z. Elsherbeni, K. Alharbi
(13) UV Laser System Test of Mini-EUSO. V. Kungel, M. E. Bertaina, F. Bisconti, M. Casolino, J. Eser, L. Wiencke, JEM-EUSO Collaboration
(14) Combination of electrokinetics and magnetodynamics promises a novel method of micro-nano motor propulsion. N. Uyanga, A. Haque, N. Wu
(15) Increasing Etch Selectivity during Plasma Assisted Atomic Scale Etching of SiO2 over SiNx. R. J. Gasvoda, Z. Zhang, E. A. Hudson, S. Agarwal

Physical and Chemical Processes
(1) Force Field Construction for Uranium in LiCl-KCl Eutectic Molten Salt. J. Tellez
(2) Palladium catalyzed polymer synthesis of for application as charge transport materials in perovskite solar cells. D. Astridge, A. Sellinger
(3) Frustrated Lewis Pairs with Applications in Hydrogen Storage. G. Russell-Parks, B. G. Trewyn, T. Gennett
(4) Helical Conformations of Perfluorochemicals: Impacts on Stability and Properties. M. Pagenkopf, D. Van Hoomissen
(6) Oxidative esterification using a tandem enzyme/inorganic catalytic system supported on mesoporous silica nanoparticles. K. Metzger, M. Moyer, B. Trewyn
**Technical Program - Short Form**

**Physical and Chemical Processes (cont.)**

(9) Adsorption Isotherm Predictions for Multiple Molecules in MOFs Using the Same Deep Learning Model. **R. Anderson**, A. Biong, D. Gomez-Gualdron

(10) Synthesis and Integration of Polymerizable Phenylfluorene Dopants in Polyvinyltoluene Plastic Scintillators. **C. Chandler**, D. Astridge, A. Lim, A. Selliger

(11) Interlayer Registry Effects on the Electronic and Piezoelectric Properties of Transition Metal Dichalcogenide Bilayer Heterostructures. **S. Likith**, G. Brennecka


(15) Development and Exploration of All-Back-Contact Perovskite Solar Cells, **K. Prince**, L. Wheeler, C. Wolden


(18) Entropy Stabilized Oxides: Thin Film Texture and Effects on Electrical Properties. **V. Jacobson**, A. Mis, D. Diercks, B. To, A. Zakutayev, G. Brennecka


(20) Combinatorial synthesis of ternary and quaternary alloy oxides emitters for CdTe solar cells. **G. Yeung**, Y. Samoilenko, C. Wolden
Technical Program - Long Form

Civil & Environmental Engineering
(2) Performance and Microbial Resilience of an Open Water Wetland following a Catastrophic Flood Event. A. Brady, M. Vega, E. Lundeen, J. Siegmund, J. O. Sharp
(4) Responses of microbial communities to climate perturbations and the implications for forest soil decomposition. L. Leonard, Z. Hao, E. Brodie, K. Williams, J. Sharp

Energy & Energy Materials
(1) Scalable Synthesis of Li2S Nanocrystals for Solid-State Electrolyte Applications. W. Smith, Y. Zhao, C. Wolden
(2) Investigating Li concentration in Li-ion batteries at extreme fast charging rates. L. Meyer, J. Porter, D. Curran
(3) Impact of Phase Change Material Hysteresis in Building Energy Performance. E. Burrell
(4) Decomposing a renewable energy system design and operation optimization model. J. Wales, A. Newman, A. Zolan
(6) Thermal performance analysis of local construction materials under hot semi arid climate of Marrakech Morocco. F. Z. Benaddi, P. C. Tabares-Velasco

Semiconductor Devices
(1) Passivating Effects of Se in CdTe Thin Film Photovoltaics. J. Wands, C. Hsu, C. Ferekides, A. Rockett
Technical Program - Long Form

Semiconductor Devices (cont.)
(3) Impact of cation site disorder in ZnGeN2 on electronic properties via Metropolis Monte Carlo method. J. Cordell, J. Pan, C. Melamed, G. J. Tucker, A. Tamboli, S. Lany

Physics
(1) Quantum Heat Engine Simulated on Superconducting Circuits. N. Materise, E. Kapit
(2) Leveraging amyloidogenic property of alpha-synuclein for its purification in E. coli. S. Kamboj, C. Harms, D. Creamer, C. West, L. Kumar, J. Klein-Seetharaman, S. K. Sarkar
(3) Three-Dimensional Single-Shot Ptychography. D. Goldberger, J. Barolak, C. Durfee, D. Adams
(5) Variational and Unsupervised Machine Learning of Quantum Many-body States. A. Lidiak, Z. Gong

Metallurgy & Materials
(1) Critical Assessment of Microstructural Effects on Liquid Metal Embrittlement in Gen3 Automotive Steels. D. Bhattacharya
(2) Microstructure Refinement Strategies in Carburized Steel. M. Agnani, O. DeNonno, K. Findley, S. Thompson
(5) A New Yield Criterion Accounting for Anisotropy and Anisotropic Asymmetry from Near Isotropy to Triclinicity. Z. Brunson, A. Stebner
(6) Determining Mode I Fracture Toughness of Adhesive Composite Joints: Autonomous Crack Tracking using MATLAB Developed Program. P. Caltagirone, D. Cousins, D. Snowberg, A. Stebner
(7) Performing Under Pressure: Investigating Pressure-Induced Phase Transformations in Rare Earth Orthophosphates. J. Sharma, B. Haberl, C. Packard
Technical Program - Long Form

Geology
(1) Enhancing engineering geological reconnaissance and analysis using machine learning and remote sensing. L. Weidner, G. Walton
(2) Taking the tectonic pulse of Paleoproterozoic orogenesis: U-Th-Pb monazite geochronology of the metasediments in the Colorado Front Range. M. Lehman, R. Palin
(3) Lost Circulation Management: New Engineering Approaches and Techniques for Better Bridging and Sealing the Fracture. S. Alhaidari, A. Eustes
(4) Effects of Profit-based Royalties in Early Mineral Exploration. E. Castillo
(5) Experimental study and analytical modeling of an intermittent gas lift system for liquid loaded horizontal wells in tight shale reservoirs. D. Croce
(6) Investigating the boundaries of the southeastern New England Avalon terrane: New LA-ICP-MS U-Pb zircon dates from igneous and metasedimentary rocks. S. M. Ellison, Y. Kuiper, J. Crowley, D. Murray

Tunneling and Excavation
(1) Expanding Understanding of the Voussoir Beam Analog in Flat-Roof Excavations Using the Discrete Element Method. R. Abousleiman, G. Walton, S. Sinha
(3) Characterizing the Dynamics Associated with the Hydroexcavation of Reinforced Shotcrete and Concrete Liners. J. Bourgeois
(5) Simulating the Behavior of Compressively Loaded Blanco Mera Granite Using Bonded Block Models. I. West, G. Walton

Geophysics
(1) 4D Quantitative Interpretation of Jubarte Field (Brazil) – an Integrated Approach. A. Damasceno, A. tura, J. Simmons
(2) Seismic characterization of overpressurized tight-gas sandstone in the Neuquen Basin, Argentina. A. Silva, A. Tura
(3) Seismic deblending applications on a 4D synthetic ocean bottom seismic data based on an offshore field in Brazil. M. Velasques, A. Tura, J. Simmons
Technical Program - Long Form

Geophysics (cont.)
(4) Geolocation of Horizontally Unconstrained Aerial Ground-Penetrating Radar Surveys. J. Bartrand, J. Bradford

Environmental Science
(1) The groundwater and weather connection in the Rockies: How soil water redistribution schemes could impact anabatic wind development, mountain-valley circulation, and moist convection in meteorological forecasts. M. Forrester, R. Maxwell
(2) Hydrologic response to pre-fire mitigation treatments in the Ashland, Oregon basin. J. Kurzweil
(3) Remotely estimating groundwater pumping and irrigation: a synthesis approach using GRACE and advances in integrated hydrologic modeling. L. Thatch, J. Gilbert, R. Maxwell
(4) Developing Low-Cost Open Seismic Nodal Design For Humanitarian Groundwater Investigations. G. Wilson, C. Young, B. Bernstein, J. Shragge
(5) Improvements to Atmospheric Carbon Monoxide Models. W. Daniels, D. Hammerling, R. Buchholz

Computational Biology
(1) Mathematical model of suprachiasmatic nucleus with multiple time scales arising from electrophysiology and gene regulation. A. Colclasure, C. Diniz Behn
(2) Modeling Glucose-Insulin Dynamics in Patients with Cystic Fibrosis. J. Garrish, C. Diniz Behn, C. Chan
(3) Quantification of Hepatic Insulin Sensitivity in Obese Adolescent Girls. K. Bartlette, C. Diniz Behn, B. C. Bergman, K. J. Nadeau, M. Cree-Green
(4) Thrombin-Fibrin Binding Dynamics Under Flow. M. Kelley, K. Leiderman
(5) Experimental design and identifiability in models of blood coagulation. L. Albrecht, K. Leiderman, D. Nychka, D. Monroe, S. Sindi
(6) Patient-Monitored Diagnostics for Early Detection of Transplant Rejection. G. Su Han, D. Domaille
(7) Exploring the Role of Gender in Perceptions of Robotic Noncompliance. R. B. Jackson, T. Williams, N. Smith
Technical Program - Long Form

Modelling & Simulation
(1) Data-driven study to accelerate development of corrosion resistant Zn-Mg-Al-Sn coating alloys with low liquidus temperature. R. Bardapurkar, S. Seetharaman, J. Speer, C. Borg, M. Davidson
(2) Heat transfer through mold slag layers in steel continuous casting. L. Das
(4) Probing the Origins of Exceptional Mechanical Damping in MAX Phase Ceramics at the Atomic Scale. G. Plummer, G. J. Tucker
(5) Predicting Preferred Segregation Sites using Atomic Structural Descriptors. J. Tavenner, A. Gupta, G. Tucker
(6) Artificial intelligence approaches for quantifying phase information from HRTEM images of alloys. S. Liu, B. Amin-Ahmadi, B. Kappes, A. Stebner, X. Zhang
(7) Sub-Gridding Errors in Standard and Hybrid Higher Order FDTD Simulations. M. Le, A. Elsherbeni, M. Hadi

Chemistry & Chemical Engineering
(1) Architectural Analysis of Complex Polymers via Soret Contraction Factor. M. Toney, K. Williams
(2) Influence of block copolymer chemistry on interactions at catalyst interfaces in anion exchange membrane fuel cells. N. Buggy, Y. Du, M. Kuo, E. B. Coughlin, A. M. Herring
(3) Optimizing PVA and citrate concentration to Maximize the Concentration of Gold Nanocrystal using Turkevich Method. Z. Liu
(4) Counting biological particles: analytical challenges at the nanoscale. C. Plavchak, K. R. Williams
(5) Merging Whole Cell Biocatalysis with Organocatalysis Upgrades Alcohol Feedstocks in One Pot Process. K. N. Stewart, E. G. Hicks, D. W. Domaille
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**Presenters Alphabetically by Department**

(Interdisciplinary Programs: *Hydrology, †Material Science, ‡Nuclear Science and Engineering, *Operations Research with Engineering, **Quantitative Biosciences and Engineering, ¥Underground Construction and Tunneling)

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See you next spring!