

Expanding Access to STEM Education

The 31st Annual Cottrell Scholar Conference
July 16-18, 2025



Objectives

To empower scholars to build community and participate in information exchange, participants will:

- Welcome the members of the 2025 Cottrell Scholar class and facilitate their interactions with other members of the community
- Engage in community building by celebrating Holland and STAR/IMPACT awardees
- Engage in authentic dialogue with the goal of identifying pressing issues affecting academic environments
- Discuss successful activities and approaches for making STEM more equitable
- Identify topics that may lead to successful Cottrell Scholars Collaborative projects
- Have the opportunity to form teams and become involved in STEM education projects with national impact

Diversity, Inclusion and No Harassment

Research Corporation for Science Advancement fosters an inclusive and respectful environment for listening in which the different identities, backgrounds, and perspectives of all participants are valued, and in which everyone is empowered to share ideas as fellow scientists.

RCSA does not tolerate any form of harassment, which could include verbal or physical conduct that has the purpose or effect of substantially interfering with anyone else's participation or performance at this conference, or of creating an intimidating, hostile, or offensive environment; any such harassment may result in dismissal from the conference.

Read RCSA's Code of Conduct



Contents

From the President	3
Conference Agenda	4
Meeting Space Map	7
Keynote Speaker	8
2025 STAR and IMPACT Awards	9
2025 Holland Awards	11
Cottrell Scholars Collaborative Proposal Guidelines / Conference Survey	13
2025 Cottrell Scholars	14
Conference Participants	22

From the President

Welcome to the 2025 Cottrell Scholars Conference in Tucson. It is a true pleasure to have you join us.

Since 1994, Research Corporation for Science Advancement has supported over 550 Cottrell Scholars -- many of whom have gone on to become global leaders in science. Cottrell Scholars from the U.S. and Canada, along with Fulbright-Cottrell Scholars from Germany, have played an essential role in advancing the physical sciences. They exemplify our shared value of excellence in both research and teaching, preparing future generations to lead in the physical sciences and related disciplines.



This year, we are also pleased to welcome the third cohort of Holland Award recipients. Designed by Cottrell Scholars, the Holland Award honors outstanding senior researchers whose experiences and perspectives lie beyond the current scope of the Cottrell Scholar community.

The Cottrell Scholars Conference is a time to celebrate our newest Scholars and to cultivate the collaborative networks that support your research, teaching, and careers. This year, those connections are especially vital. Many of you are navigating disruptions to your work and lives. I urge you to use this time to forge new relationships or rekindle existing ones. Please know you are not alone. RCSA remains firmly committed to supporting the scientific and teaching communities through this crisis -- and beyond.

These programs and gatherings would not be possible without the extraordinary efforts of many. I extend special thanks to Cottrell Scholar 2000 Michael Dennin, University of California, Irvine, for co-chairing this year's conference with RCSA Senior Program Director Silvia Ronco. I'm also grateful to all the Cottrell Scholars for your continued engagement and dedication to research and the training of future teacher-scholars, and for committing some of your valuable time to this conference.

The ongoing success of the Cottrell Scholars, Scialog, and RCSA Fellows programs is made possible by the exceptional RCSA staff. In particular, we are all indebted to Silvia Ronco, whose passion and broad support has greatly shaped the Cottrell Scholar community. I also thank Program Directors Richard Wiener, Cottrell Scholar 2002 Andrew Feig, and Cottrell Scholar 1995 Eileen Spain who help foster the vibrant RCSA community through our Scialog and RCSA Fellows programs.

I look forward to meeting you and wish you a productive, inspiring, and collegial conference.

Warm regards,

Eric D. Isaacs

President

Research Corporation for Science Advancement

2025 Cottrell Scholar Conference Agenda

Expanding Access to STEM Education

July 16 – 18, 2025

Wednesday, July 16

2:00 – 6:00 pm	Registration	Lobby Foyer
3:00 – 4:15 pm	Opening Reception Drinks and Light Hors d'Oeuvres	Murphey/Murphey Patio
4:15 – 4:30 pm	Welcome and Introductions Eric Isaacs, Dan Linzer, Silvia Ronco, and Michael Dennin	Murphey
4:30 – 5:45 pm	2025 Cottrell Scholar Presentations	Murphey
6:00 – 7:00 pm	Dinner	Sonoran
7:00 – 8:00 pm	Cottrell STAR Award Presentation Richard Brutchey	Sonoran
	Cottrell Scholar Trophy Ceremony	

2025 Cottrell Scholar Conference Agenda

Expanding Access to STEM Education

July 16 – 18, 2025

Thursday, July 17

7:00 am	Registration	Sonoran II Foyer
7:00 – 8:00 am	Breakfast	Murphey/Murphey Patio
8:00 – 9:15 am	2025 Cottrell Scholar Presentations	Sonoran
9:15 – 9:30 am	Morning Break	Sonoran II Foyer
9:30 – 10:45 am	Keynote Presentation <i>Can We (Finally) Transform Undergraduate STEM Education for All Students?</i> Archie Holmes, The University of Texas System	Sonoran
10:45 am – 12:00 pm	Breakout Session I <i>What Does It Really Mean to be a Scientist?</i> Curriculum-Centered Perspective	Finger Rock I, II, III and Primrose
12:00 – 12:15 pm	Report Out – Action Items	Sonoran
12:30 – 1:30 pm	Lunch	Murphey/Murphey Patio
1:30 – 2:45 pm	Breakout Session II <i>Sense of Belonging in STEM</i> Equity, Environment, and Well-Being in STEM-Centered Perspective	Sonoran
2:45 – 3:00 pm	Report Out – Action Items	Sonoran
3:00 – 5:30 pm	Informal Networking Swimming, Casa 71 Tequila Lounge	
5:30 – 7:00 pm	Reception Honoring New Community Members Poster Session: 2025 CS, CS Collaborative Projects Drinks and Light Hors d'Oeuvres	Terrace Level Foyer & Patio
7:00 – 9:00 pm	Dinner Holland Award Presentations Kevin Hewitt, Angel Martí, Enrico Ramirez Ruiz	Sonoran

2025 Cottrell Scholar Conference Agenda

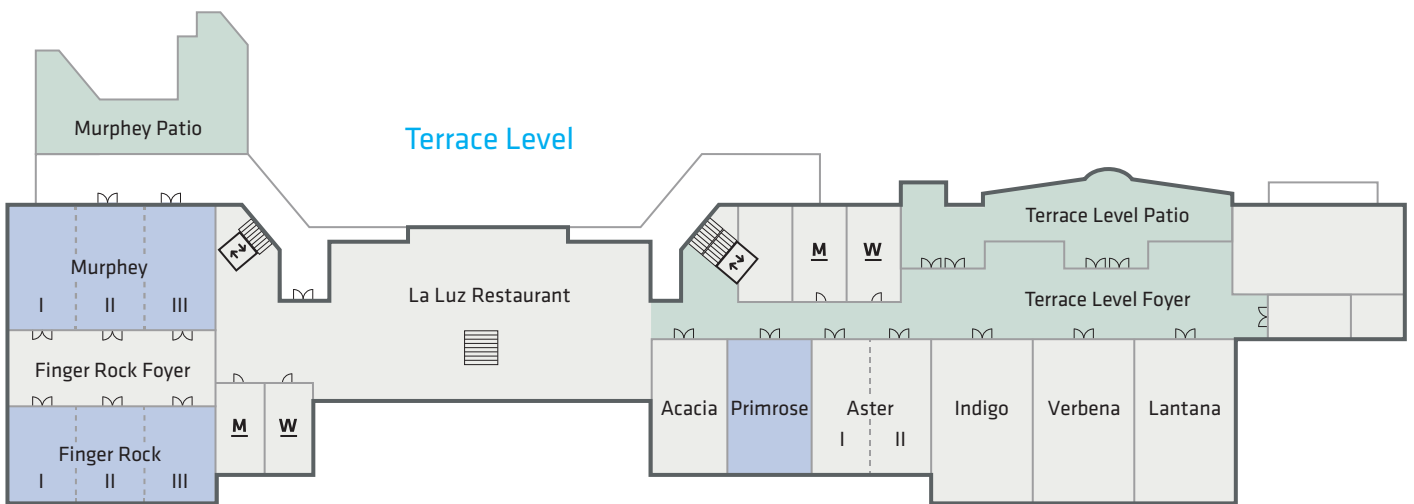
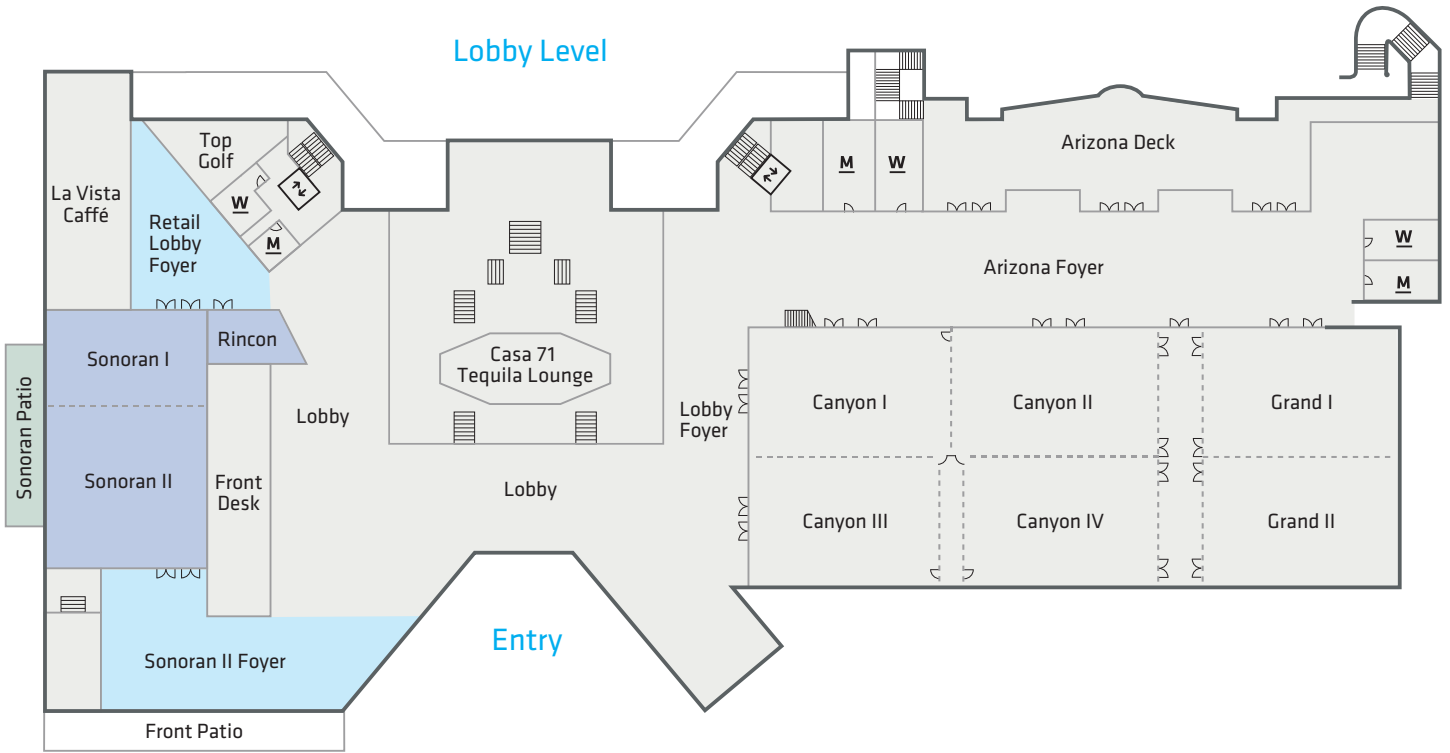
Expanding Access to STEM Education

July 16 – 18, 2025

Friday, July 18

7:00 – 8:30 am	Breakfast	Murphey/Murphey Patio
8:30 – 10:00 am	Cottrell STAR and IMPACT Award Presentations Eric Hegg, Jenny Ross, Michael Strauss	Sonoran
10:00 – 10:30 am	Morning Break	Sonoran II Foyer
10:30 – 12:15 pm	General Discussion <i>The Future of Graduate STEM Education</i>	Sonoran
12:15 – 1:45 pm	Lunch	Murphey/Murphey Patio
1:45 – 3:30 pm	Breakout Session III <i>Unstructured Time to Work on Educational Collaborations; Interest Group Meetings</i>	All Spaces
3:30 – 4:00 pm	Conference Wrap-Up & Survey	Sonoran
4:00 – 6:00 pm	Informal Networking Swimming, Casa 71 Tequila Lounge	
6:00 – 7:00 pm	Reception Drinks and Light Hors d'Oeuvres	Terrace Level Foyer/Patio
7:00 – 9:30 pm	Family Dinner All guests are invited to join!	Terrace Level Foyer/Patio

Westin La Paloma Resort and Spa



Keynote Speaker

Can We (Finally) Transform Undergraduate STEM Education for All Students?

Archie L. Holmes Jr.

Executive Vice Chancellor for Academic Affairs
The University of Texas System



Abstract: An undergraduate education in science, technology, engineering, and mathematics (STEM) equips students with the knowledge and skills needed to better understand the world around them. This foundation empowers them to pursue a range of goals such as making informed decisions as engaged members of society or contributing to the STEM workforce, which plays a vital role in driving American innovation, national security, and economic growth.

Despite the efforts of many instructors and academic leaders to scale evidence-based teaching practices, higher education has not yet fulfilled its promise of providing a STEM education that enables students from all backgrounds to thrive.

In this session, Cottrell Scholars will explore a recent consensus study report from the National Academies, *Transforming Undergraduate STEM Education: Supporting Equitable and Effective Teaching*, along with resources from the National Academies' Roundtable on Systemic Change in Undergraduate STEM Education. By the end of the session, participants will gain insight into how these materials can support their individual and collective efforts to foster equitable, inclusive, and effective learning environments that empower all students to succeed.

Biography: Archie Holmes joined The University of Texas System as Executive Vice Chancellor for Academic Affairs in October 2020. He provides oversight and guidance for the nine UT System academic institutions, which enroll more than 220,000 students, produce nearly 59,000 graduates, and have an aggregate annual operating budget of more than \$6.7 billion.

Prior to joining UT System, Holmes was the Vice Provost for Academic Affairs at the University of Virginia and was a faculty member at both the University of Virginia and The University of Texas at Austin. As Vice Provost for Academic Affairs, he served as chief advisor to and representative of the executive vice president and provost in academic matters related to the curriculum and general health and welfare of the academic units. Over this career, Holmes has co-authored over 110 referred technical articles and 70 conference presentations and received numerous awards for his teaching and advising activities.

Holmes graduated from Round Rock High School in 1986 and received his bachelor's and Ph.D. degrees, both in electrical engineering, from the University of Texas at Austin and the University of California at Santa Barbara respectively.

2025 STAR Awards

Richard Brutchey

Chemistry, University of Southern California



STAR Award recipient **Richard Brutchey**, Professor of Chemistry at the University of Southern California, is recognized for research that pushes the boundaries of materials synthesis, demonstrating that targeted molecular programming and innovative methodologies can unlock new classes of materials with transformative properties. He is also an advocate for engaging and retaining students in STEM by providing hands-on research opportunities for community college students, who frequently miss this critical research exposure. As part of his original Cottrell Scholar Award, Brutchey partnered with Cerritos College, where 55% of students identify as first-generation college students, to launch an eight-week summer internship program combining classroom learning with hands-on research. A key aspect of the program is continued mentorship, where graduate student and faculty mentors help interns navigate the transfer process to four-year institutions, provide letters of recommendation, and encourage students to participate in the program for multiple summers. More than 60 interns from Cerritos College have matriculated through the program, which continues today, and more than 95% of them have transferred to a four-year university and majored in STEM.

Jenny Ross

Physics, Syracuse University



STAR Award recipient **Jenny Ross**, Professor of Physics and Associate Dean for Creativity, Scholarship, and Research in the College of Arts and Sciences at Syracuse University, is an award-winning scientist breaking new ground in biophysics and active matter research, a selfless mentor and research collaborator, and an unapologetic advocate for systemic change in the scientific community. Under her leadership, the physics department at Syracuse has transformed its undergraduate curriculum, replacing the traditional introductory physics labs with “Experiencing Physics,” a set of inquiry-based CURE labs that have significantly improved teaching and learning outcomes and retention of students in the physics major. She developed a summer high-school internship program in collaboration with Syracuse City Schools creating a pipeline for students into science majors. Her leadership includes formal roles in academic leadership, high levels of service to the major scientific societies, and grassroots leadership through organization of faculty informally using listserv groups. Through each of these approaches, she seeks to support the scientific community from students to faculty.

2025 IMPACT Awards

Eric Hegg

Biochemistry & Molecular Biology, Michigan State University



IMPACT Award recipient **Eric Hegg**, Professor of Biochemistry and Dean of Michigan State University's College of Natural Science, has made extensive contributions to scientific understanding and practical applications in the field of alternative energy research and bioenergetics. His work on lignocellulosic biomass conversion, co-developing a pretreatment process that efficiently separates lignin from cellulose and hemicellulose in woody biomass, not only facilitates the production of fermentable sugars for biofuels but also yields high-quality lignin suitable for creating valuable bioproducts, such as renewable chemicals and polyurethane applications. In the realm of enzymology, Hegg has conducted pivotal studies on cytochrome c nitrite reductase, which converts nitrite, a common environmental contaminant, into ammonia. His research has provided deeper insights into the enzyme's electron storage and distribution mechanisms, contributing to a better understanding of the global nitrogen cycle. Additionally, Hegg has explored the biosynthesis and transport of heme a, a vital component in cellular respiration and bioenergetics. Hegg's impact extends to various leadership roles in the Department of Energy Great Lakes Bioenergy Research Center and in the DOE Center for Catalysis in Biomimetic Confinement, where his collaborative efforts have helped advance bioenergy research and the development of sustainable solutions for energy production. He has also advised the U.S. House Science, Space, and Technology Committee and provided input on draft legislation.

Michael Strauss

Astrophysical Sciences, Princeton University



IMPACT Award recipient **Michael Strauss**, Chair of the Department of Astrophysical Sciences at Princeton University, is an international leader in the massive sky surveys that are transforming astronomy. He joined the Sloan Digital Sky Survey project near the beginning, playing several roles including Spokesperson of the collaboration, organizing the scientific community in writing papers based on the data and releasing it to the world, establishing a new paradigm for how astronomy and large surveys are carried out. As a researcher in the areas of extragalactic astronomy and cosmology, he and his colleagues used data from the SDSS to discover the most distant objects known at the time, quasars seen when the universe was only 5% of its present age. Strauss has also played key roles in the Vera C. Rubin Observatory Legacy Survey of Space and Time, advocating for the observatory and its survey for the 20+ years since it was first conceived. He was one of the principal organizers of the Rubin Science Collaborations, preparing the scientific community for the flood of data the 10-year survey will produce beginning later this year, and serving as editor of the LSST Science Book, which was key for convincing the astronomical community (and funding agencies) that the observatory should be built.

2025 Holland Awards

Kevin Hewitt

Physics, Dalhousie University

Kevin Hewitt, Full Professor of Physics, Natural Sciences and Engineering Research Council of Canada Chair for Inclusion in Science and Engineering, and Associate Dean at Dalhousie University, runs an interdisciplinary research program that integrates optical and spectroscopic instrumentation development with biomedical and materials science applications. He co-founded the Imhotep Legacy Academy, a STEM bridge program that has been running at Dalhousie University for 21 years and has been replicated at other institutions across Canada. He has been a guest on Canada's national flagship *CBC Ideas* program, featured in the series *Cool Black North*, and recognized with top provincial and national awards for science promotion. He has been recognized for his community engagement with Queen Elizabeth II's Platinum Jubilee medal in Nova Scotia and a Youth Community Service Award in British Columbia, and the national Harry Jerome Award for Professional Excellence.



Angel Martí

Chemistry, Rice University

Angel Martí, Chemistry Department Chair, Rice University, has established breakthrough research on the chemistry and self-assembly of nanostructures dimensions to create advanced macroscopic materials. Furthermore, his research with photoactive metal complexes has been a turning point in amyloid research, inspiring researchers worldwide to study tau, insulin, and amyloid islet proteins, among others, using metal complexes. He is the faculty director of the Rice Emerging Scholars Program, which provides under-resourced students of high potential a suite of interventions to facilitate their transition from high school to college, and to support their retention and academic success in STEM. He is an American Chemical Society Fellow, a Royal Chemical Society Fellow, and a recipient of the American Chemical Society – Southwestern Regional Meeting Stanley C. Israel Award.



2025 Holland Awards Continued

Enrico Ramirez-Ruiz

Astronomy, University of California, Santa Cruz

Enrico Ramirez-Ruiz, Astronomy Professor and Vera Rubin Presidential Chair, University of California, Santa Cruz, is a world-leading authority in the burgeoning fields of compact binary mergers, tidal disruption of stars by supermassive black holes, sources of gravitational waves, and transient astrophysics. To foster talent in STEM, he established the Lamat Institute, which primarily recruits students from community colleges. For 15 years, Lamat — meaning “star” in Mayan — has provided hundreds of students with one of the most impactful introductory research experiences in astrophysics in the nation. As a result, Lamat has played a key role in doubling the number of historically marginalized students enrolled in top astronomy Ph.D. programs in the U.S. between 2017 and 2021. He is a Fellow of both the American Academy of Arts and Sciences and the Mexican Academy of Sciences.



Cottrell Scholars Collaborative Proposal Writing Guidelines

Successful proposals should have the potential to positively impact undergraduate and/or graduate science education in the classroom, at the departmental level or at the national level.

- Up to four \$25,000 awards will be given to teams of Cottrell Scholars working collaboratively.
- Two-year awards are made to a team formed at this conference.
- Members of the team are Cottrell Scholars, Fulbright-Cottrell Scholars, or Holland awardees.
- Award could be for a new project that will expand the impact of existing funded collaborative projects. New collaborative projects are also welcome.
- CSC proposals consist of two pages plus an optional third page with references. Proposals must include a statement of the problem, a working plan, anticipated impact, how the outcomes will be broadly disseminated, and a brief budget justification.
- CSC proposals must be submitted through the RCSA online submission system (PRISM, <https://prism.rescorp.org>) by 11:59 PM Pacific on **August 6, 2025**.
- Awards will be announced within a month of submission. The tentative start date is October 1, 2025.

Conference Evaluation Survey

An online conference survey will be available on Friday, July 18, 2025. To access and complete the survey, please go to:



2025 Cottrell Scholars

Camille Avestruz

Physics, University of Michigan

Modeling Giants in our Universe: Galaxy Clusters as Probes of Cosmology

Galaxy clusters are the giants of our universe, made up of hundreds to thousands of galaxies. The number count and distribution of galaxy clusters over time trace the history and content of our universe, otherwise known as cosmology. We can detect and measure galaxy clusters using light from the night sky across the electromagnetic spectrum – this includes light in wavelengths of the microwave and X-rays. To interpret these measurements in the era of big data, we need fast modeling techniques and inference methodologies. In this project, my group will leverage new methods to construct physically motivated statistical connections between the underlying matter content of galaxy clusters and what we can see in the night sky, and incorporate machine learning approaches to speed up inference for galaxy cluster cosmology. My education plan for this award focuses on the development and integration of computer coding skills in the introductory physics laboratory sequence for a broad range of undergraduates in the physical sciences. Students will gain fluency with Python coding through task-based learning applied to a combination of laboratory and simulated data. Tasks center on the three main stages of any data analysis procedure: data generation/input/output, data wrangling and pattern extraction, and data visualization. By introducing early scaffolded Python skill development, I aim to increase access, community, knowledge integration, and post-graduate career options for our undergraduates.



Lucas Busta

Chemistry, University of Minnesota Duluth

Using Artificial Intelligence to Predict Enzyme Products and Enhance Chemical Education

As a Cottrell Scholar, I will be working on developing methods with which we can use large language models (artificial intelligence) to predict the precise chemical reactions that are catalyzed by specific DNA and protein sequences. This will involve experimentally determining the chemical reactions catalyzed by more than 100 different DNA fragments and then training language model and machine learning systems on those experimentally determined properties so that the systems can make predictions about sequences they have not seen before. In parallel, I will develop and evaluate teaching tools and instructional modules designed to teach students about the strengths, weaknesses, and applications of language models systems. These teaching tools and research findings will be shared with the scientific community so that others can leverage the advances made as part of this project.



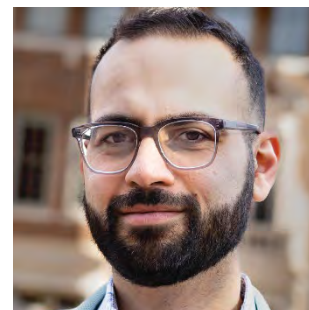
2025 Cottrell Scholars Continued

Bassil El-Zaatari

Chemistry, Davidson College

Catalyzing Dynamic Exchanges in Polymers and the Classroom

Synthetic polymers, or plastics, have become an integral part of daily life. However, the continued buildup of inherently non-recyclable plastics such as cross-linked thermosets represents a major environmental problem necessitating more sustainable alternatives. One method of tackling this problem is through the design of polymeric materials that utilize dynamic covalent chemistry within the material, which can afford reprocessability under specific stimuli. Our work will target the development of photoactivated catalysts that can enable such dynamic exchange reactions within silicone-based polymers. While heat is traditionally employed as a stimulus for triggering these exchange reactions, the use of light offers spatial and temporal control, allowing for precise and targeted modulation of material properties. My educational efforts will aim to improve chemistry education at Davidson College by providing students with a more holistic understanding of how chemistry intersects other fields such as environmental science, public policy, economics, and the social sciences. Through the development of deliberative debate labs in our general chemistry course and systems of thinking modules in our polymer chemistry course, I aim to enhance students' conceptual understanding of chemical principles while connecting it to real-world challenges.

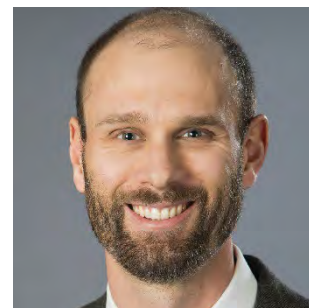


Tyler Engstrom

Physics, University of Northern Colorado

Prestress-Generated Odd Elasticity with Applications to Waveguides

Odd elasticity refers to a specific kind of anti-symmetry in the equation relating stress and strain in solids, as well as the unusual mechanical behaviors that accompany this mathematical structure. Work from the past several years has shown that odd elasticity can arise in non-traditional solids composed of active or driven constituents, with applications ranging from new engine concepts to robotic metamaterials to one-way waveguides. The Cottrell Scholar award will support my theoretical investigations into a new way to generate odd elasticity: from certain stresses present in the reference configuration about which a solid deforms, with an emphasis on exploring waveguide phenomena and applications. The award will also help me promote and increase summer undergraduate research and internship opportunities for physics majors at the University of Northern Colorado, particularly those who are first-generation and/or underrepresented, and who stand to benefit most from these high-impact practices.



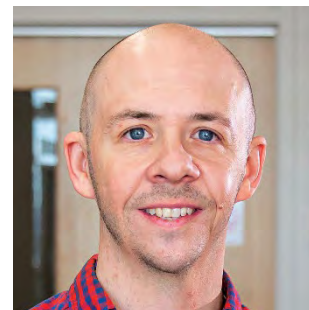
2025 Cottrell Scholars Continued

Aaron Harrison

Chemistry, Trinity University

Resolving Brown Carbon and Bioaerosol Fluorescence in Atmospheric Studies

Atmospheric aerosols, originating from both biogenic and anthropogenic sources, play pivotal roles in climate regulation, air quality, and public health. With support from the Cottrell Scholar Award, my research will address the challenge of accurately identifying these aerosols by distinguishing between brown carbon (BrC) and bioaerosol fluorescence. While fluorescence spectroscopy is instrumental in differentiating aerosol types, BrC can mimic bioaerosol fluorescence, leading to potential misidentification in environmental settings. This research will implement both condensed-phase and particle-phase fluorescence measurements, including excitation-emission matrix (EEM) and time-resolved fluorescence (TRF) spectroscopy. By analyzing the EEM and TRF spectra of primary and secondary BrC, the study aims to more effectively distinguish fluorescence features and associate them with specific aerosol components. This approach is expected to enhance our understanding of aerosol detection and composition, and the outcomes will inform interpretation of fluorescence-based atmospheric field studies and contribute to more effective environmental measurement and monitoring. In addition, this award will support modernizing the Analytical Chemistry curriculum by integrating essential computational skills, including Python programming, data analysis, and experience with computational tools. The initiative updates the traditional course content to better align with current ACS guidelines while remaining accessible to students from a wide range of academic backgrounds. A major aspect of this revision is its potential for adoption across different higher education institutions, as the course's structure and content have been designed to be both accessible and adaptable for broader implementation at colleges and universities.



Nick Jackson

Chemistry, University of Illinois at Urbana-Champaign

Electronic Dynamics Using Coarse-Grained Molecular Representations

This research will leverage machine learning to describe electronic dynamics in large molecular systems from a computationally cheaper coarse-grained molecular representation. This will enable simulations of electronic dynamics at unprecedented length and timescales for disordered molecular systems. This research is coupled with a targeted effort to get the essentials of statistics, programming, and machine learning into the chemistry curriculum at the University of Illinois at Urbana-Champaign for early stage undergraduates, and to reinforce it in subsequent years.



2025 Cottrell Scholars Continued

Alvine Kamaha

Physics, University of California, Los Angeles

Improving Background Mitigation in Dark Matter Searches and Improving the Diversity of the Workforce in Dark Matter Searches

85% of the universe's matter is so-called dark matter, an invisible substance that has been present since the early universe and acted as glue to enable the formation of large-scale structures like our own Milky Way galaxy. Discovering this matter will help us understand our universe's evolution – including the impact of the Big Bang – as well as its fate. Dark matter could consist of Weakly Interacting Massive Particles (WIMPs), which are hypothetical elementary particles that interact with gravity and a weak nuclear-type force. Particle physicists have been searching for these WIMP dark matter and other particle candidates by building super-sensitive detectors to detect rare scatters off nuclei in underground-based experiments. However, these detectors are also sensitive to particles from regular matter, which often produce signals that mimic the dark matter signals. Reducing this background noise is therefore paramount in the search for the elusive dark matter signal. In my lab we will build a prototype detector for nuclear background calibrations in xenon detectors (a leading detector technology) that will help ensure that a positive experimental result is indeed an actual signal and not noise due to an incomplete understanding of the regular particle processes. This detector and other in-situ detectors purchased for general particle characterization will be used in the educational arm of my project to build a more inclusive particle physics research laboratory at UCLA in an effort to strengthen and enhance the undergraduate research experience of transfer students.



Lawrence Lee

Physics, University of Tennessee, Knoxville

Developing Muon Collider Technologies: Building Tomorrow's Discovery Collider Today

To answer some of the most fundamental questions in physics, new energy scales need to be probed in the laboratory. One of the research programs in my group is to study ways to reach higher energies by colliding intense beams of muons, the heavier cousin of the electron. Building a muon collider for the first time would require overcoming numerous technological hurdles stemming from the muon's metastability. Designing solutions to these accelerator challenges can enable newfound insight into the nature of the Higgs boson and dark matter, while looking for surprises in the complete unknown. Creating an effective workforce for the future of this work requires engaging a community with a wide range of experiences and perspectives. The community college pipeline plays a crucial role in the research pipeline, providing opportunity to many students who for a variety of reasons may have pursued a transfer-based path. I aim to strengthen the physics transfer pipeline with targeted support, addressing challenges unique to the transfer experience such as non-uniform preparation and so-called "transfer shock." This will include dedicated mentoring pathways and increased coordination with community colleges.



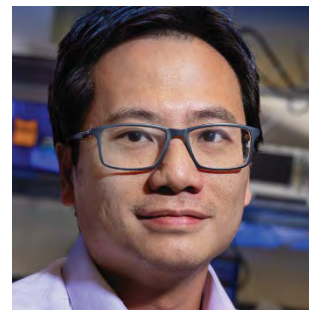
2025 Cottrell Scholars Continued

Chris Li

Chemistry, University at Buffalo SUNY

Development of a Plasma Electrochemical System for Air-to-Ammonia Conversion

My group is developing a plasma-electrochemical system to produce ammonia, an important industrial chemical, directly from air. We will investigate the activation chemistry of nitrogen in a plasma field and the reaction pathways of NO_xH_y species to ammonia in an electrochemical setting, enabling us to achieve both high production rates and high selectivity for ammonia. This study will provide fundamental insights into an important industrial chemical reaction and demonstrate a new platform for green chemical synthesis. Our educational efforts focus on developing a series of low-cost DIY analytical instruments, course materials, and accompanying video lectures for teaching analytical chemistry. The goal of these tools is to provide undergraduate students with hands-on experience to better understand analytical instruments and to improve access to chemistry education for resource-restricted communities.



Adam Miller

Astronomy, Northwestern University

Simultaneously Early and Late: Leveraging LS4 and LSST to Understand the Physics of White Dwarf Supernovae

Some white dwarf (WD) stars in binary star systems can become unstable and experience runaway nuclear fusion leading to a spectacular explosion known as a Type Ia supernova (SN Ia). The study of SNe Ia led to the discovery of the accelerating Universe and Dark Energy, work that awarded the Nobel prize. My Cottrell Scholar program aims to determine which binary star systems can produce a SN Ia by conducting a novel experiment combining observations from two new time-domain surveys, the Vera C. Rubin Observatory's Legacy Survey of Space and Time (LSST) and the La Silla Schmidt Southern Survey (LS4) to determine the progenitors of SNe Ia. LS4 will capture nearby supernovae when they are young and these observations will be combined with very-late observations from LSST to produce results that are greater than the sum of their parts. My education component is motivated by challenges associated with retaining Ph.D. students from all groups in society. Building on my experience as Director of the LSST-DA Data Science Fellowship Program (DSFP), a unique data-science training program for astronomy graduate students, I will implement the ONBOARD program for matriculating physics and astronomy Ph.D. students at Northwestern. The matriculation program will provide critical training in scientific computing, which is transferrable to other universities, and establish multiple connections between students and potential mentors as they begin graduate school to foster a more welcoming community within the department.



2025 Cottrell Scholars Continued

Ryan Poling-Skutvik

Physics, University of Rhode Island

Developing a Dynamic Taxonomy of Soft Matter for a New Era of Material Design

The fundamental axiom of materials science is that structure determines function, but for soft materials in which thermal forces result in dynamic relaxations, this axiom breaks down and we struggle to predict and control their mechanical properties. Our work inverts this paradigm to focus on dynamics, in combination with molecular interactions, as the fundamental mechanism governing soft material properties. In this research plan, we will incorporate dynamic descriptors into a rational taxonomic structure that simplifies our understanding of soft matter, enabling predictive control and design. Additionally, we will leverage the insights generated through this research to design and implement a new course at the University of Rhode Island that introduces young students to the field of soft matter physics through a combination of lectures, hands-on experimentation, and connections to culture and society. This course will challenge students to directly connect physical principles to real-world experiences to ground scientific insight in clear, practical examples and more deeply motivate student learning.



Liliana Rivera Sandoval

Astronomy, University of Texas Rio Grande Valley

Investigating the Effects of Stellar Interactions in Globular Clusters through their Compact Binary Population

The Cottrell Scholar Award will allow me to study the effects of stellar interactions on binary stars, particularly those that harbor the remnants of dead stars. I will use data ranging from X-rays to radio waves of various exotic binary populations, along with state-of-the-art models to investigate how stellar dynamics influence the formation and destruction of binaries in highly dense stellar environments known as globular clusters. This research will provide valuable insights into stellar evolution and will explore its broader cosmological implications. Additionally, the educational component of my award will provide a broad range of students with opportunities to engage more closely with experts in astronomy and space sciences, fostering collaborations, participation in research projects, and helping them build a stronger foundation for their academic and career goals. The award will also support initiatives aimed at highlighting the importance of women in astronomy and increasing access to science for non-academic communities.



2025 Cottrell Scholars Continued

Sabrina Stierwalt

Astronomy, Occidental College

Fostering Community in Undergraduate Physics Students through Community Based Learning and Innovative Research

Most of what we know about the smallest galaxies in the universe comes from studies of our closest galaxy neighbors. However, the evolution of these nearby galaxies is strongly affected by the dominating presence of our much more massive Milky Way's gravitational influence. My work uses innovative search techniques to find groups of small galaxies isolated from a massive neighbor. Studying these isolated groups will push the boundaries of what we know about the evolution of small galaxies before they have merged to form a larger one. As a Cottrell Scholar, I will also build a curriculum that incorporates community-based learning into introductory physics courses. By working on projects in the diverse communities throughout Los Angeles, students can see direct connections between their physics studies and the ability to make real life change.



V. Ashley Villar

Astronomy, Harvard University

Closing the Gap: Linking Luminous Red Novae to Binary Stellar Evolution

Stars are the fundamental building blocks of our Cosmos. They create heavy elements, drive the chemical and kinematic histories of galaxies, and birth exotic compact objects (like black holes and neutron stars). Massive stars are particularly important across nearly every field of astrophysics (e.g., supernova, galaxy and gravitational wave science). However, understanding the life cycles of massive stars is complicated by the fact that the vast majority of these stars live with an interacting binary companion. This award investigates one of the only observational means to understand the binary interaction of massive stars to directly test theories of stellar evolution and understand how stars interact / merge. In parallel, the award supports development of a new first-year seminar that encourages students to think like interdisciplinary scientists. This seminar will focus on bridging gaps between scientific disciplines, fostering critical thinking, and equipping students with the tools to tackle complex problems. By incorporating real datasets, developing a shared language across disciplines, and engaging with scientific literature, the course will prepare students to navigate and integrate diverse areas of study. This approach will promote innovative thinking and collaborative problem-solving, essential for future scientific leaders in a data-driven world.



2025 Cottrell Scholars Continued

Allison Walker

Chemistry, Vanderbilt University

Discovery of Enzyme Catalyzed Chemical Reactions Guided by Artificial Intelligence

Molecules produced by living things are synthesized with the help of enzymes, which are proteins that catalyze chemical reactions and have been used to help chemists synthesize new molecules. Previous work relied mostly on luck to discover enzymes that enable interesting chemical reactions. With the support of the Cottrell Scholar Award, I will develop methods based on Artificial Intelligence for the discovery of new enzymes that catalyze interesting and useful chemical reactions. This award will also support the development of courses that will train chemistry students in how to apply programming and artificial intelligence to problems in chemistry and biochemistry. These courses will include a research course where students will get hands-on experience in combining computation and lab work to discover new enzymes.



Marissa Weichman

Chemistry, Princeton University

Quantum State Resolution of Aromatic Molecules for Laboratory Astrochemistry

Light beaming to us across space encodes features arising from the absorption and emission of photons by a menagerie of interstellar molecules. Concrete identification of these astrochemical species is key to understanding star, planet, and galaxy formation and the prebiotic origins of life. Interpretation and assignment of observational data is driven by laboratory spectroscopy of known molecules. It is therefore essential that we develop next-generation laboratory spectroscopies with improved resolution, sensitivity, and scope. Here, we will harness cavity-enhanced frequency comb spectroscopy and cryogenic molecular cooling methods to fully resolve rovibrational structure in large molecules predicted to carry astrochemical bands. We will target a class of carbonaceous molecules known as polycyclic aromatic hydrocarbons and their derivatives. We will use our laboratory spectra both to re-interpret existing observational infrared emission data and to guide new observational campaigns. This work will improve our understanding of the chemical composition of astrophysical environments and establish new records in the size and complexity of molecular systems that can be studied with complete quantum state resolution. We are also revitalizing Princeton's undergraduate quantum chemistry course, CHM 305, "The Quantum World," with aims to improve quantitative and conceptual learning outcomes in students from a broad range of academic backgrounds; improve attitudes towards and sense of belonging in quantum; and increase the number of course alumni pursuing further quantum-adjacent coursework, research, and careers.



Conference Participants

Mario Affatigato CS 1996

maffatig@coe.edu

Physics, Coe College

Glass science, including applied projects and fundamental work on atomic arrangements, electronic conductivity, and extreme conditions. Impact of undergraduate research experiences and advanced undergraduate physics courses (looking at the "physics beyond the math").

Katherine Aidala CS 2009

kaidala@mtholyoke.edu

Physics, Mount Holyoke College

My expertise is atomic force microscopy, with a present focus on electrical properties of organic semiconductors and 2D materials. I am a physicist at a women's college, with interests in persistence in STEM, project based learning, and STEM literacy for non-majors.

Carlos Argüelles Delgado CS 2024

carguelles@g.harvard.edu

Physics, Harvard University

High-energy neutrinos and the extreme Universe. Looking for probes of new phenomena with astrophysical neutrinos. AI and physics education.

Tim Atherton CS 2015

timothy.atherton@tufts.edu

Physics and Astronomy, Tufts University

Soft condensed matter physics, notably liquid crystals, emulsions, jamming and shapeshifting materials through computer simulations. Active Physics Education Researcher on Inclusive Environments, Learning Computation and AI in the physics classroom.

Camille Avestruz CS 2025

cavestru@umich.edu

Physics, University of Michigan

I'm interested in using simulations to test methods for galaxy cluster analysis, including modeling techniques and inference methodologies. I'm interested in the integration of computer coding skills in the introductory physics laboratory sequence, specifically Python analysis.

Carlos Baiz CS 2020

cbaiz@cm.utexas.edu

Chemistry, University of Texas at Austin

Physical Chemistry. Spectroscopy. Molecular Dynamics. Biophysics of proteins and membranes. Graduate education. Grad student success. Advising.

Gordon Berman CS 2019

gordon.berman@emory.edu

Biology, Emory University

My group models animal behavior across timescales to uncover how neural and internal states shape individual and social dynamics. I design interdisciplinary courses that teach the analysis of high-dimensional scientific data using theory, coding, and curiosity

Penny Beuning CS 2009

P.Beuning@northeastern.edu

Chemistry and Chemical Biology, Northeastern University

My group studies DNA damage responses, DNA-protein interactions, and enzyme engineering, relevant to cancer and antibiotic resistance. I aim to increase support for students in introductory chemistry courses and provide graduate student and faculty professional development.

Karen Bjorkman CS 1999

karen.bjorkman@utoledo.edu

Physics and Astronomy, University of Toledo
Observational Astronomy, Massive Stars, Circumstellar Disks, teaching astronomy and physics, mentoring undergraduate and graduate students in research

Steve Bradforth CS 1999

stephen.bradforth@usc.edu

Chemistry, University of Southern California

Ultrafast spectroscopy and reaction dynamics, photoionization in water, photoelectron spectroscopy; light harvesting, DNA photodamage. Undergraduate and community college research opportunities. Active in efforts spearheaded by AAU and RCSA in reform of STEM education.

Conference Participants Continued

Richard Brutchey CS 2010

brutchey@usc.edu

Chemistry, University of Southern California
We develop new materials synthesis methods to address challenges related to catalysis, energy storage and conversion, and sustainability. We run a community college outreach program that brings local community college students to campus each summer for research internships.

Raychelle Burks HOL 2023

burks@american.edu

Chemistry, American University
Development of detection methods for forensic and national security applications. Experiential learning activities research and development.

Mark Bussell CS 1994

mark.bussell@wwu.edu

Chemistry, Western Washington University
Development of heterogeneous catalysts based on metal phosphides for photocatalytic CO₂ conversion and semi-hydrogenation reactions. Expanding research experiences for first-year and community college students through CUREs

Luke Busta CS 2025

bust0037@d.umn.edu

Chemistry, University of Minnesota Duluth
Developing methods for large language models to predict the precise chemical reactions catalyzed by specific protein sequences. Developing and evaluating teaching tools related to generative artificial intelligence.

Dennis Cao CS 2019

dcao@macalester.edu

Chemistry, Macalester College
Synthesis and characterization of optically and electronically interesting aromatic molecules. Teaching students to teach themselves. Learning as a scientific practice in and of itself.

Matt Caplan CS 2023

mecapl1@ilstu.edu

Physics, Illinois State University
Computational physics / Strongly coupled plasmas in white dwarfs and neutron stars / Black hole accretion / Dark Matter Arms control and nuclear weapons policy / Public education via YouTube with Kurzgesagt & PBS SpaceTime.

Tim Clark CS 2007

clarkt@sandiego.edu

Chemistry and Biochemistry, University of San Diego
Organic chemistry research that focuses on metal-catalyzed reactions for the formation and reactions of carbon-boron bonds. Early education research opportunities and experiences: high school, incoming undergraduates, and undergraduate students.

Seth Cohen CS 2004

scohen@ucsd.edu

Chemistry and Biochemistry, University of California, San Diego
Fragment-based drug discovery (FBDD), metalloenzyme inhibitors, metal-organic frameworks (MOFs), MOF-polymer composites. Science policy, organic chemistry, inorganic chemistry, trainee symposia, postdoctoral scholars.

Luis Colón HOL 2024

lacoln@buffalo.edu

Chemistry, University at Buffalo SUNY
Synthesis, characterization/application of silica-based adsorbent materials; chemical analysis/separations. Improvement of undergraduate laboratory; undergraduate research opportunities for underserved populations.

Conference Participants Continued

Katherine de Kleer CS 2024

deklee@caltch.edu

Geological and Planetary Sciences & Physics, Math and Astronomy, California Institute of Technology
Solar System astronomy: The thermal evolution of the Solar System from geochemical signatures; Hands-on, project-based learning in astronomy and physics

Michael Dennin CS 2000

mdennin@uci.edu

Physics & Astronomy, University of California, Irvine
My research focus is on how structures around curricular design, institutional policy, and course policies impact student outcomes. My education interests focus on how best to define what the educational experience for a student should be and how to optimize assessment.

Joel Destino CS 2021

joeldestino@creighton.edu

Chemistry, Creighton University
Developing materials & chemical measurement with interests in colloids, glass, 3D-printing, luminescent chemical sensors, & spectroscopy. UG research mentoring. 1st gen & URS engagement. Active learning that informs social consciousness and connects the classroom to the world

Charlie Doret CS 2017

scd2@williams.edu

Physics, Williams College
Atom-based-tests of physics beyond the Standard Model, quantum simulation with trapped ions. Making physics accessible via inclusive pedagogy and undergraduate research opportunities.

Javier Duarte CS 2023

jduarte@ucsd.edu

Physics, University of California, San Diego
I am developing artificial intelligence techniques for high-energy particle collisions to search for and measure elementary particles. I am developing computational physics courses, including topics like machine learning, data science, and research collaboration.

Bassil El-Zaatari CS 2025

baelzaatari@davidson.edu

Chemistry, Davidson College
My research interests lie in polymer synthesis, characterization and sustainable materials development. These lie in promoting polymer chemistry, fostering deliberation, and advancing systems thinking in undergraduate chemical education.

Tyler Engstrom CS 2025

tyler.engstrom@unco.edu

Physics and Astronomy, University of Northern Colorado
My research interests lie in theoretical soft matter physics and biophysics, and are focused around the elasticity of thin structures. My main educational interest is improving the engineering physics concentration at my PUI through new courses and internship opportunities.

Daniela Fera CS 2021

dfera1@swarthmore.edu

Chemistry and Biochemistry, Swarthmore College
We seek to understand the development of antibodies against viral pathogens. Towards this goal, we probe protein-protein interactions. Active learning, course-based undergraduate experiences

Carla Fröhlich CS 2014

cfrohli@ncsu.edu

Physics, North Carolina State University
Supernovae, compact object mergers, multi-messenger astronomy, neutrinos, nucleosynthesis, computational astrophysics. Assessment and grading. How to best include AI into teaching. How to best support students in a rapidly changing job and funding landscape.

Conference Participants Continued

Jordan Gerton CS 2007

jordan.gerton@utah.edu

Physics and Astronomy, University of Utah

PER: What intuitions do students leverage when learning quantum mechanics? How do we maximize student sensemaking in introductory labs? I am working with colleagues to develop a "forces first" approach to introductory mechanics, and we are developing a related PER agenda.

John Gilbertson CS 2009

gilberj4@wwu.edu

Chemistry, Western Washington University

Our group is interested in coordination complexes for small molecule activation and the deoxygenation of pervasive environmental pollutants. I am interested in modern pedagogical techniques to facilitate student interaction and learning.

Jason Gillmore CS 2006

gillmore@hope.edu

Chemistry, Hope College

Undergraduate research on materials-relevant organic photoswitches, including synthesis, photochemistry, electrochemistry, and computation. Course-based undergraduate research experiences, peer-led team learning, mentoring aspiring and junior faculty, organic & general chemistry

Vera Gluscevic CS 2023

vera.gluscevic@gmail.com

Physics and Astronomy, University of Southern California

Cosmology and astroparticle physics; probes of dark matter and new physics; CMB; galaxy formation and evolution; simulation and inference. Broadening participation in STEM, data literacy, use of AI in education.

Boyd Goodson CS 2005

bgoodson@chem.siu.edu

Chemical & Biomolecular Sciences, Southern Illinois University Carbondale

I'm interested in hyperpolarized nuclear spin systems and their use as MRI contrast agents and targets in fundamental physics experiments. I'm interested in interactive approaches in gen chem, modules in p-chem lab courses, NMR/MRI demos, and involving undergrads in research.

Leslie Hamachi CS 2024

hamachi@calpoly.edu

Chemistry and Biochemistry, California Polytechnic State University, San Luis Obispo

Synthesis and surface chemistry of colloidal covalent organic frameworks. Curriculum development for Cal Poly's "Learn by Doing Lab" which provides undergraduate students with hands-on teaching experience.

Ling Hao CS 2023

linghao1@umd.edu

Chemistry and Biochemistry, University of Maryland, College Park

Developing mass spectrometry-based analytical chemistry methods to understand molecular interaction and organelle dynamics. Enriching both undergraduate and graduate students' research and mentoring experience as well as skills in science communication.

Aaron Harrison CS 2025

harrisoaar005@trinity.edu

Chemistry, Trinity University

My research focuses on developing novel spectroscopic methods to elucidate the composition and transformations of atmospheric aerosols. My analytical and physical chemistry teaching emphasizes building student skills in data acquisition, analysis, and computational chemistry.

Conference Participants Continued

Jen Heemstra CS 2015

heemstra@wustl.edu

Chemistry, Washington University in St. Louis
Biomolecules do amazing things! We leverage the recognition capabilities of proteins and nucleic acids for biomedical applications. Creating a healthier culture in academic spaces so that everyone has the resources and environment they need to thrive.

Eric Hegg CS 2002

erichegg@msu.edu

Natural Science, Michigan State University
Global nitrogen cycle enzymes, focusing on reducing N loss from soil, contamination of waterways, and the production of greenhouse gases. Expanding experiential learning opportunities on a large scale (>5000 students); developing quality online programs.

Rigoberto Hernandez CS 1999

r.hernandez@jhu.edu

Chemistry, Johns Hopkins University
Theoretical/Comp @JHUChemistry, nonequilibrium dynamics: reactions, TST, SCTST, nanoparticles, neuromorphic, proteins @EveryWhereChem Inclusion & Belonging @OxideChem, Academic Leadership Training Workshops, ACS Leadership Experience, 2025 ACS President-Elect

Kevin Hewitt HOL 2025

Kevin.Hewitt@Dal.ca

Physics and Atmospheric Science, Dalhousie University
My Bionanophotonics lab creates optical tools for molecular holography, liver transplantation, breast cancer, and Vitamin D detection. I create programs to increase inclusion in Science, Technology, Engineering along the entire lifecycle - from kindergarten to professionals.

Mike Hildreth CS 2003

mhildret@nd.edu

The Graduate School, University of Notre Dame
Experimental Particle Physics, Effective Practices in Graduate Education. Graduate education, particularly co-curricular programs that enhance the student experience

Archie Holmes Keynote Speaker

aholmes@utsystem.edu

Electrical and Computer Engineering, The University of Texas System
Development of novel optoelectronics devices. Instructional interventions which assist students in their transition from novice to expert problem solvers.

Brent Iverson RCSA Board of Directors

iversonb@austin.utexas.edu

Chemistry, University of Texas at Austin
Supramolecular Chemistry, Protein Engineering, Therapeutic Biologics Undergraduate Chemical education, undergraduate general education, student support programs.

Nick Jackson CS 2025

jacksonn@illinois.edu

Chemistry, University of Illinois at Urbana-Champaign
Molecular modeling, machine learning, soft materials, coarse-graining, electronic processes Integrating data science, statistics, and programming into the undergraduate chemistry curriculum.

Alvine C. Kamaha CS 2025

akamaha@physics.ucla.edu

Physics and Astronomy, University of California, Los Angeles
Experimental astroparticle physics: mainly interested in optimizing detector technologies used to hunt for the Universe's missing matter. Bolster the diversity of the STEM pipeline by helping URM undergrads to become more competitive and equipped for grad school in physics.

Conference Participants Continued

Evan Kirby CS 2018

ekirby@nd.edu

Physics & Astronomy, University of Notre Dame
The origin of the elements of the periodic table and how they are dispersed into stars and galaxies; Active learning, evidence-based learning, hierarchical near-peer mentoring

Lydia Kisley CS 2023

lydia.kisley@case.edu

Physics (primary) and Chemistry (secondary), Case Western Reserve University
Develop super-resolution fluorescence microscopy to study the extracellular environment, chemical separations, and corrosion. Incorporating instrumentation in core facilities in the classroom.

Roman Kogler FCS 2024

roman.kogler@desy.de

High Energy Physics (FH), German Electron Synchrotron DESY
Experimental particle physicist studying particle collisions at the highest energies with the CMS experiment at CERN. Integrating artificial intelligence into undergraduate physics courses to facilitate the learning process and reveal its limitations.

Tim Kowalczyk CS 2018

kowalc2@wwu.edu

Chemistry, Western Washington University
I am interested in computational and data-driven approaches to excited state processes and energy storage in organic materials. My current education interests include best practices for AI-assisted coding in training physical science students as end-user programmers.

Larry Lee CS 2025

llee@utk.edu

Physics and Astronomy, University of Tennessee, Knoxville
Research in collider physics to study nature at the highest energy scales. Find evidence for new kinds of particles. Physics of muon beams Support of community college transfer students. Musical and artistic science outreach. Interdisciplinary pedagogy, design thinking in physics

Adam Leibovich CS 2006

akl2@pitt.edu

Physics and Astronomy, University of Pittsburgh
Theoretical physics, using effective field theories for calculations involving heavy quark physics, jet physics, and gravitational waves Active learning, graduate education.

Chris Li CS 2025

yuguangli@buffalo.edu

Chemistry, University at Buffalo SUNY
We are interested in all aspects of electrochemistry, include electrocatalysis, battery and electroanalytical techniques development. We are interested in developing low cost DIY analytical instruments to provide a hands-on approach to undergraduate analytical chemistry.

Huey-Wen Lin CS 2020

hwlin@pa.msu.edu

Physics and Astronomy, Michigan State University
Computational Physics, High-Performance Computing, Theoretical Particle and Nuclear Physics, Machine Learning, Quantum Computing Teach physics & modeling using flipped classrooms; focus on inclusion, problem-solving, and peer learning in STEM education

Conference Participants Continued

Fang Liu CS 2024

fang.liu@emory.edu

Chemistry, Emory University

My group develops machine learning models and computational workflows to design and discover functional molecules in solutions. I aim to integrate data science and programming into the core courses of the chemistry curriculum.

Dinah Loerke CS 2014

dinah.loerke@du.edu

Physics & Astronomy, University of Denver

I study the biomechanics of epithelial layers during early fly development using quantitative image analysis. Active learning and interdisciplinary teaching for undergraduates, and peer mentoring and building community for graduate students

Jorge López HOL 2024

jorgelopez@utep.edu

Physics, University of Texas at El Paso

I study nuclear physics, materials science, and apply scientific methods to social sciences. Have had grants from NSF, NASA, DOE, DoD. I have created science education programs funded by NSF, NASA, etc. and have used constructivism, inquiry-based teaching, PLTL, etc.

Gina MacDonald CS 1997

macdongx@jmu.edu

Chemistry & Biochemistry, James Madison University

Using spectroscopy to study how different environmental influences alter protein, structure, stability and aggregation and modulate disease. Using active learning in the classroom and integrating research-like experiences into formal coursework.

Angel A. Martí HOL 2025

aam4@rice.edu

Chemistry, Rice University

Using photochemistry to study a variety of topics, including amyloid aggregation, cellular temperature, and nanomaterials. Removing barriers of success and supporting first-generation low-income students to thrive while pursuing STEM degrees.

Charles McCrory CS 2019

cmccrory@umich.edu

Chemistry, University of Michigan

Developing electrocatalytic systems for upcycling industrial wastes into value-added chemical feedstocks and fuels. Improving conceptual knowledge development in large-format undergraduate courses.

Adam Miller CS 2025

amiller@northwestern.edu

Physics and Astronomy, Northwestern University

I study stellar evolution (especially stellar death) using astronomical experiments measuring brightness variations as a function of time. I love teaching computing techniques to scientists that are interested in working at the intersection of physical science and data science.

Emily Miller Guest

emily.miller@aau.edu

Association of American Universities

Evidence-informed educational innovations, faculty reward structures, systemic organizational & cultural change at universities. Advancing multi-institutional strategies and approaches at the department level to promote student academic success.

Conference Participants Continued

Mark Moldwin CS 1997

mmoldwin@umich.edu

Climate and Space Sciences and Engineering,
University of Michigan

I am a space physicist who studies the Earth's magnetosphere and ionosphere and the Sun's heliosphere. I build magnetometers. I enjoy teaching non-science majors and working with postdocs and early career faculty to support their professional development.

Maren Mossman CS 2024

mmossman@sandiego.edu

Physics and Biophysics, University of San Diego

The creation and manipulation of ultracold atoms to study fundamental questions arising primarily in hydrodynamics. Creating spaces where students feel welcome and empowered to do physics. Always looking to improve teaching and classroom dynamic.

Katie Mouzakis CS 2017

kathryn.mouzakis@lmu.edu

Chemistry and Biochemistry, Loyola Marymount
University

My research is focused on viral RNA structures that regulate translation. I am interested in the integration of course-based undergraduate research experiences into the chemistry and biochemistry curriculum.

Jorge Munoz CS 2022

jamunoz@utep.edu

Physics, University of Texas at El Paso

Materials thermodynamics. Microcredentials.

Jamie Neilson CS 2017

james.neilson@colostate.edu

Chemistry, Colorado State University

My application-inspired, materials chemistry research program seeks to find the limits of selective materials synthesis and discovery. Active learning activities, particularly in a graduate class setting.

Kerstin Nordstrom CS 2018

knordstr@mtholyoke.edu

Physics, Mount Holyoke College

My lab works on experimental studies of granular and complex fluid flows. In particular, we are interested in measuring the microscale. I do education research in physics identity and belonging. I am always interested in improving my teaching and mentoring practices.

Ali Patteson CS 2023

aepattes@syr.edu

Physics, Syracuse University

Biological physics, soft matter active learning, in the lab, group work

William Pfalzgraff CS 2023

w.pfalzgraff@chatham.edu

Chemistry, Chatham University

Developing theoretical methods to elucidate chemical dynamics in heterogeneous environments, especially interfaces. Using programming, visualization and simulation tools to improve student learning in physical chemistry and geoscience.

Ryan Poling-Skutvik CS 2025

ryanps@uri.edu

Chemical Engineering, Physics, University of Rhode
Island

Soft matter synthesis and characterization. Relating physics to everyday life.

Rosario Porrás-Aguilar CS 2021

rporrasa@uncc.edu

Physics and Optical Sciences, University of North
Carolina at Charlotte

Label-free, reconfigurable microscopy for bioimaging — democratizing access to smart, non-invasive optical technologies. Fostering curiosity and critical thinking through inclusive STEM education and mentorship that inspires students to recognize their power.

Conference Participants Continued

Aurora Pribram-Jones CS 2022

apj@ucmerced.edu

Chemistry and Biochemistry, University of California, Merced

I study how interaction strength, temperature, and density impact our understanding of electronic structure in molecules and materials. I am a "liminal criminal." I aim to subvert unjust barriers, examine structures of scholarly identity, and explore reflective practices.

Enrico Ramirez-Ruiz HOL 2025

enrico@ucolick.org

Astronomy and Astrophysics, University of California, Santa Cruz

I test out astrophysical theories with computer simulations that defy the boundaries of human experience. I work vigorously to support the promotion and retention of women and historically marginalized students in STEM.

Becky Rapf CS 2024

rrapf@trinity.edu

Chemistry, Trinity University

My lab is interested in interfacial chemistry and photochemistry applied to atmospheric and astrobiology problems. I'm interested in supporting quantitative reasoning and problem solving of students throughout the undergraduate chemistry curriculum.

Paul Raston CS 2019

raston@hawaii.edu

Chemistry, University of Hawaii at Manoa
Microwave and laser spectroscopy of exotic molecules that are relevant to combustion, the atmosphere, or interstellar space. Teaching physical chemistry to undergrads in lecture and lab, and developing scientific instrument simulators

Noel Richardson CS 2023

noel.richardson@erau.edu

Physics and Astronomy, Embry-Riddle Aeronautical University

I study massive binary stars and how they interact with techniques spanning optical and infrared techniques. I am interested in using research methods and computing in the classroom to teach students not only what we know but how we learn it.

Chad Risko CS 2018

chad.risko@uky.edu

Chemistry, University of Kentucky

Computational chemistry and AI/ML approaches for materials design and discovery. Bringing physical chemistry to the masses

Liliana Rivera Sandoval CS 2025

liliana.riverasandoval@utrgv.edu

Physics and Astronomy, University of Texas Rio Grande Valley

I am interested in studying the formation, evolution and interaction in binaries with stellar remnants as well as transients sources. I would like to learn new techniques and tools to make teaching more effective and accessible.

Shahir Rizk CS 2019

srizk@iu.edu

Chemistry and Biochemistry, Indiana University South Bend

Protein engineering, biosensor design, and science communication; Science communication, combatting misinformation, intersection of art and science

Rae Robertson-Anderson CS 2010

randerson@sandiego.edu

Physics and Biophysics, University of San Diego
active matter, soft matter, optical tweezers, rheology, microscopy, biopolymers, cytoskeleton, DNA undergraduate research, science communication, interdisciplinary courses/majors

Conference Participants Continued

Jenny Ross CS 2010

jlross@syr.edu

Physics, Syracuse University

How does the cell organize its insides without a manager? Experiential learning through trial and error to enable students from every walk of life to have access to physics.

Vincent Rotello CS 1996

rotello@chem.umass.edu

Chemistry, University of Massachusetts Amherst

I'm an organic chemist working in the areas of antimicrobial nanomaterials, bioorthogonal chemistry, and point of care diagnostics. My primary focus is on integrative graduate courses designed to provide soft skills including collaboration, communication, and networking.

Zac Schultz CS 2013

schultz.133@osu.edu

Chemistry, Ohio State University

My research focusses on trace detection and imaging using spectroscopy, microscopy, machine learning, and nanomaterials. I am interested in graduate education broadly and in the development of active learning in instrumentation and data analysis.

Scott Shaw CS 2016

scott-k-shaw@uiowa.edu

Chemistry, University of Iowa

Environmental and Energy Science. Science Communication. Graduate Education.

George Shields CS 1994

george.shields@furman.edu

Chemistry, Furman University

Quantum Chemistry; Computational Chemistry, Atmospheric Chemistry, Structural Biology; Intermolecular Forces; Non-covalent clusters General Chemistry; Physical Chemistry; Undergraduate Research

Brian Shuve CS 2021

bshuve@g.hmc.edu

Physics, Harvey Mudd College

I study connections between elementary particles and cosmology, and use terrestrial experiments to test the physics of the early universe. I am interested in active learning in upper-level major courses, and educating/protecting our most vulnerable and marginalized students.

Juliane Simmchen FCS 2021

juliane.simmchen@tu-dresden.de

Physical Chemistry, Dresden University of Technology

colloids, microorganisms, active matter, microplastics, complex environments, soil class engagement, fun labs, outreach

David Spivak CS 2001

dspivak@lsu.edu

Chemistry, Louisiana State University

Polymers for molecular imprinting, mechanochemistry using polymers; Organic and polymer chemistry, in particular using a map for teaching organic chemistry

Snezana Stanimirovic CS 2009

sstanimi@astro.wisc.edu

Astronomy, University of Wisconsin - Madison

Constrain physical properties of neutral interstellar gas and their influence on the process of star formation in nearby galaxies. Development of comic strips as an educational tool to encourage engagement of elementary and middle-school students in STEM.

Sabrina Stierwalt CS 2025

sabrina@oxy.edu

Physics, Occidental College

I am an extragalactic astrophysicist using nearby, interacting galaxies to understand how galaxies formed throughout the universe's history. I am interested in using high impact practices like incorporating research and community-based learning into introductory physics courses.

Conference Participants Continued

Michael Strauss CS 1997

strauss@astro.princeton.edu

Astrophysical Sciences, Princeton University

The structure of the universe and the evolution of galaxies as revealed by large-scale surveys of the sky. Astronomy as a gateway field to get students interested in STEM careers. Citizen science opportunities in astronomy.

Tim Su CS 2024

timothys@ucr.edu

Chemistry, University of California, Riverside

main group chemistry; silicon chemistry; atomically precise materials; molecular electronics general chemistry; inorganic chemistry; harnessing student-created social media videos as vehicles for chemical education and outreach

Ruby Sullan CS 2021

ruby.sullan@utoronto.ca

Physical and Environmental Sciences, University of Toronto Scarborough

Designing smart nanomaterials to study and control bacteria, biofilms, and their impacts on health and the environment. Engaging early undergraduates in hands-on research on surfaces, interfaces, and nanotechnology in biomedical and environmental applications

Daniel Tabor CS 2023

daniel_tabor@tamu.edu

Chemistry, Texas A&M University

Our group works in the area of theoretical chemistry, focusing on materials design, spectroscopy, and machine learning in chemistry. We focus on integrating data science and ML methods into small modules for undergraduates in chemistry.

Kana Takematsu CS 2019

ktakemat@bowdoin.edu

Chemistry & Biochemistry, Bowdoin College

*Excited state proton transfer; solvent-mediated charge transfer; photochemistry; CO₂ capture
Community building and belonging for students and scientists; physical and introductory chemistry*

Claire Till CS 2020

claire.till@humboldt.edu

Chemistry, California State Polytechnic University, Humboldt

Currently I'm looking into iron uptake: in the ocean in diatoms. I'm curious if scandium competitively interferes. Lately I've been thinking about how to foster critical thinking and resilience. Also how to best teach science writing.

Olalla Vázquez FCS 2016

vazquezv@staff.uni-marburg.de

Chemistry, Philipps University of Marburg

Chemical Biology. Light-driven chemical tools to understand and manipulate biological processes at molecular level. Research-based teaching strategies; multidisciplinary approaches and active learning.

Ashley Villar CS 2025

ashley.villar@gmail.com

Astronomy, Harvard University

I study the eruptions, collisions and explosions of stars using a combination of observational data and machine learning. I am deeply interested in interdisciplinary education, particularly across traditional scientific and engineering fields.

Allison Walker CS 2025

allison.s.walker@vanderbilt.edu

Chemistry, Vanderbilt University

My research focuses on the development of machine learning and other computational tools for natural product discovery and biosynthesis. My educational interests focus on how to train chemistry students in computational techniques such as AI and molecular modeling.

Conference Participants Continued

Rory Waterman CS 2009

rory.waterman@uvm.edu

Chemistry, University of Vermont

I make molecules, and on the best of days, I use really abundant, cheap molecules to better make other, fancier molecules. You name it: I teach inorganic & general chem, work with a wide range of age groups and have been involved in curricular and PD activities.

Marissa Weichman CS 2025

weichman@princeton.edu

Chemistry, Princeton University

My lab is interested in using chemical physics and spectroscopy to probe, understand, and attempt to control complex molecular processes. I am working to revitalize the undergraduate quantum chemistry curriculum at my institution.

Michael Welsh CS 2024

mwelsh@hamilton.edu

Chemistry, Hamilton College

I am interested in the biosynthesis of carbohydrate polymers that decorate the cell surface of bacteria. I hope to develop courses where students learn and apply fundamental biochemistry concepts by exploring research articles.

Chris Whidbey CS 2023

whidbeyc@seattleu.edu

Chemistry, Seattle University

*Chemical biology, microbiomes, chemoproteomics
General Chemistry, General Biochemistry, Intro and
Advanced DNA Methods*

Luisa Whittaker-Brooks CS 2018

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Chemistry, University of Utah

*Understanding spin and charge transport and ion migration in energy and quantum materials and devices using diffraction and spectroscopy.
Transforming the chemistry experience by replacing weed-out courses with deep-root and applied courses early on in students' careers.*

Justin Wilson CS 2019

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Chemistry & Biochemistry, University of California, Santa Barbara

Inorganic coordination chemistry for biomedical applications, critical mineral separations, and nuclear medicine. Developing activities for K-12 STEM teachers to use in their classrooms and educational activities on nuclear chemistry.

Amanda Wolfe CS 2017

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Chemistry and Biochemistry, University of North Carolina at Asheville

Our lab works on developing small molecule antibiotics that target bioenergetic complexes in Gram-negative pathogens. I am interested in new methods for integrating cutting edge research experiences throughout the undergraduate curriculum.

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