



CaltechAssociates

Discovering tomorrow **today**

FALL

23

WINTER

24



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Some narratives used to describe our events and presentations have been generously provided by the Caltech Science Exchange.



Dear Associates Members and Friends,

I am pleased to share our fall 2023/winter 2024 calendar with you. As you will see, we have expanded upon our traditional faculty presentations to offer “experiential” programs that take place in unique locations off campus.

One such event is a day trip to Lawrence Livermore National Laboratory (LLNL), whose National Ignition Facility has been in the news for twice achieving a net energy gain in a fusion reaction. We’ll have the opportunity to meet and hear from Dr. Tammy Ma (BS ’05), who leads LLNL’s Inertial Fusion Energy Institutional Initiative.

Another forward-thinking destination we’ll visit this fall is the future site of the Annenberg Wildlife Crossing. When completed, the crossing will be the largest wildlife corridor in the world, restoring habitat and allowing wildlife safe passage over U.S. Route 101. This will be a family-friendly

event with brunch and a presentation from Julia Tejada, assistant professor of geobiology.

In addition to these day trips, we’re also looking forward to President’s Circle dinners in New York and Northern California, and our annual Holiday Luncheon at The Athenaeum.

Since 1926, the Caltech Associates has fostered a community that brings Institute scientists and engineers together with lifelong learners, community and business leaders, philanthropists, and alums. Thank you for your generous support of faculty and research that lead to pathbreaking discoveries here at Caltech. Together, we are making the world a better place.

As always, I encourage you to maximize your membership by participating in Associates events and travel opportunities. After all, you make these fascinating events possible. I look forward to seeing you soon!

Warmest regards,

Catherine E. Reeves

Executive Director



ORANGE COUNTY / SAN DIEGO

Les Misérables

Saturday, September 30, 2023, 11:00 am · Segerstrom Center for the Arts

Set against the backdrop of 19th-century France, *Les Misérables* tells an enthralling story of broken dreams and unrequited love, passion, sacrifice, and redemption—a timeless testament to the survival of the human spirit.

As a prelude to the matinee performance, we will enjoy brunch at Avenue of the Arts Hotel, followed by a presentation, “The Laws of *Les Mis*,” from **Jocelyn Holland**, professor of comparative literature. Professor Holland will discuss the themes that shaped Victor Hugo’s sprawling 19th-century novel and its 20th-century Broadway adaptation: popular uprisings, abuses of power, and the question of the law in its moral, civil, and divine forms. **SOLD OUT**

PASADENA

Tour of JPL

Thursday, September 28, 2023, 10:00 am · Jet Propulsion Laboratory

Founded by Caltech researchers and now managed by the Institute, NASA’s Jet Propulsion Laboratory (JPL) is a leader in robotic space exploration.

Our program will begin with brunch at The Athenaeum and a presentation by JPL’s chief scientist and Caltech’s John W. and Herberta M. Miles Professor of Geophysics, **Mark Simons**, who will talk about the NASA-ISRO Synthetic Aperture Radar (NISAR). Launching within a year, this satellite mission will observe Earth’s surfaces. Professor Simons will provide examples of how we can use NISAR to study earthquakes, aquifers, glaciers, and the effects of severe weather.

Following the presentation, we’ll depart by chartered coach for our private afternoon tour of JPL, where we’ll visit the mission control center and spacecraft assembly facility.



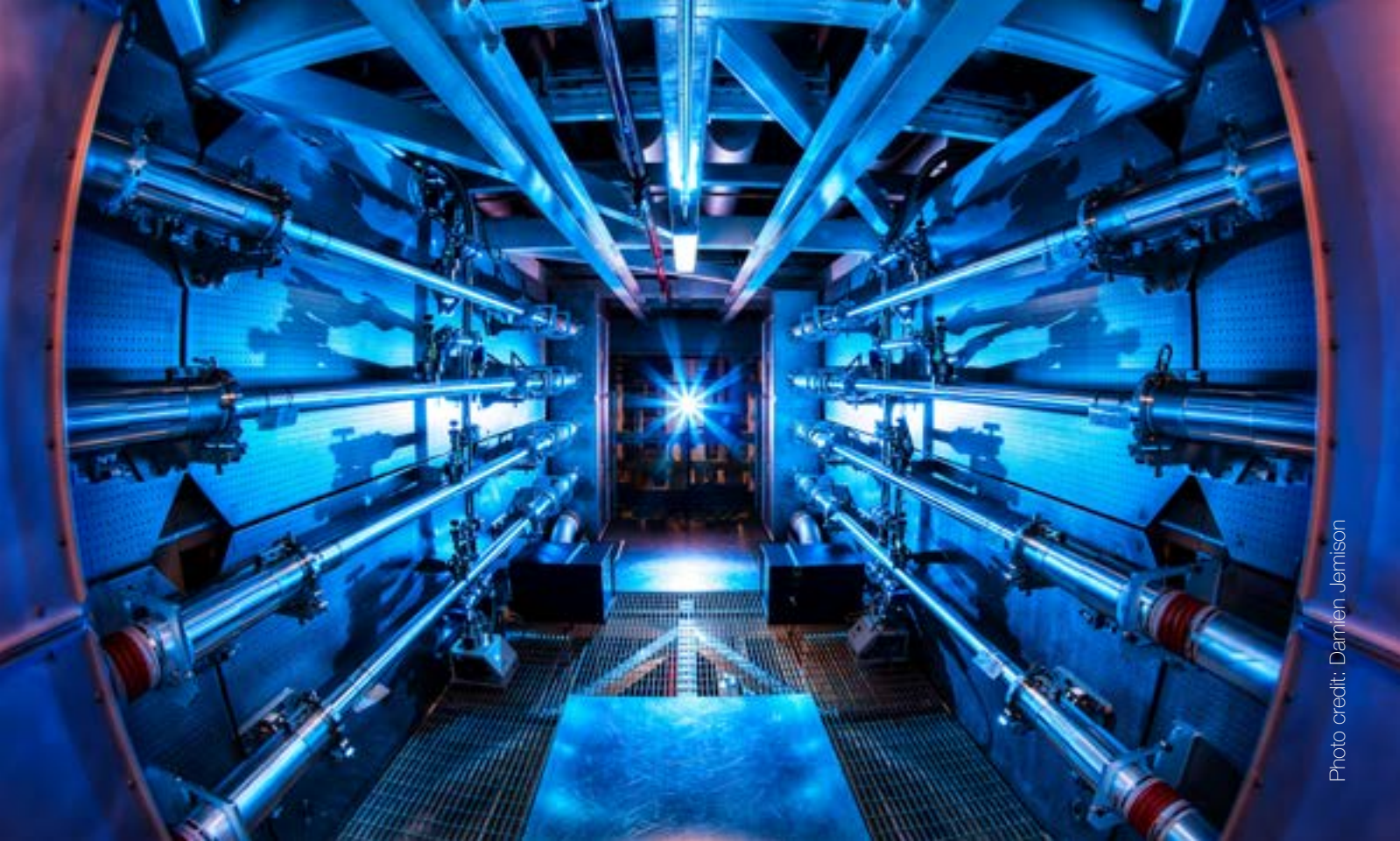


Photo credit: Damien Jemison

NEW YORK CITY

Our Quantum Future

Wednesday, November 1, 2023, 6:00 pm ·
New York Athletic Club

Advances in quantum science have already led to remarkable technologies such as lasers, magnetic resonance imaging, and billions of transistors packed onto a single microchip. But these technologies barely scratch the surface of how quantum theory has altered our view of what's possible in the universe.

Join us for a discussion with **John Preskill**, the Richard P. Feynman Professor of Theoretical Physics and holder of the Allen V. C. Davis and Lenabelle Davis Leadership Chair for the Institute for Quantum Science and Technology, about the challenge and promise of quantum technology, and learn about the potential for powerful quantum computers, unhackable encryption, and astonishingly precise measurement devices.

DAY TRIP: NORTHERN CALIFORNIA

Igniting Fusion Energy

Friday, October 27, 2023 · National Ignition Facility & Retzlaff Vineyard

In December 2022, a team at the National Ignition Facility (NIF) of Lawrence Livermore National Laboratory (LLNL) conducted the first controlled fusion experiment to reach “breakeven,” producing more energy from fusion than the laser energy used to drive it. On July 30, 2023, the team succeeded again, yielding even better results.

Tammy Ma (BS '05) leads the Inertial Fusion Energy Institutional Initiative at LLNL. In her presentation to us, she will review the NIF, the world's largest, most energetic laser, as well as the latest experimental results and the scientific and technological advancements that made this breakthrough possible. She will also discuss the implications for future research in terms of both national security and how this achievement lays the groundwork to explore laser inertial fusion as a path toward clean energy and energy security.



Annenberg Wildlife Crossing

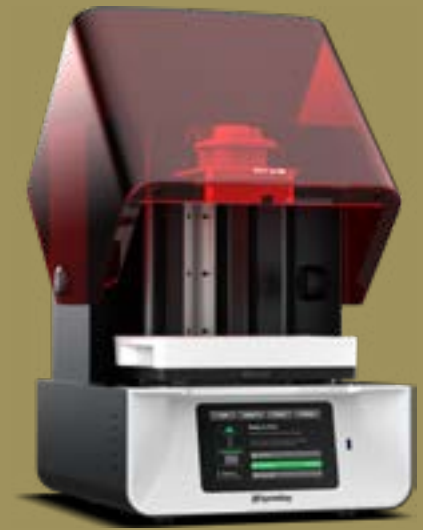
Saturday, November 4, 2023 • Agoura Hills, California

When completed in 2025, the Wallis Annenberg Wildlife Crossing will be the largest wildlife corridor in the world. Overcrossing U.S. Route 101 to reconnect the Santa Monica Mountains and the Simi Hills in Agoura Hills, California, this bridge will help restore and protect what is considered a biodiversity hotspot—one of only 36 such places in the world—and allow mountain lions and other wildlife to freely move throughout a habitat that was bisected by human development.

Our family-friendly day trip to the Annenberg Wildlife Crossing will include brunch and a presentation by **Julia Tejada**, assistant professor of geobiology, who will explore how geological processes, climate change, and biotic interactions have changed and shaped the structure of mammalian communities through time.



Visualization of the Annenberg Wildlife Crossing.



PASADENA

The Unexpected Discovery

Tuesday, November 7, 2023, 6:00 pm • SprintRay Headquarters, Los Angeles

Research in one area can unexpectedly lead to groundbreaking developments in entirely different domains, showcasing the interconnectedness of scientific discoveries. **Mory Gharib** (PhD '83), the Hans W. Liepmann Professor of Aeronautics and Medical Engineering and director of Caltech's Graduate Aerospace Laboratories and Center for Autonomous Systems and Technologies, will share the story of how his work to develop an advanced underwater camera for detecting tiny bubbles under naval vessels led to the creation of a dental imaging device.

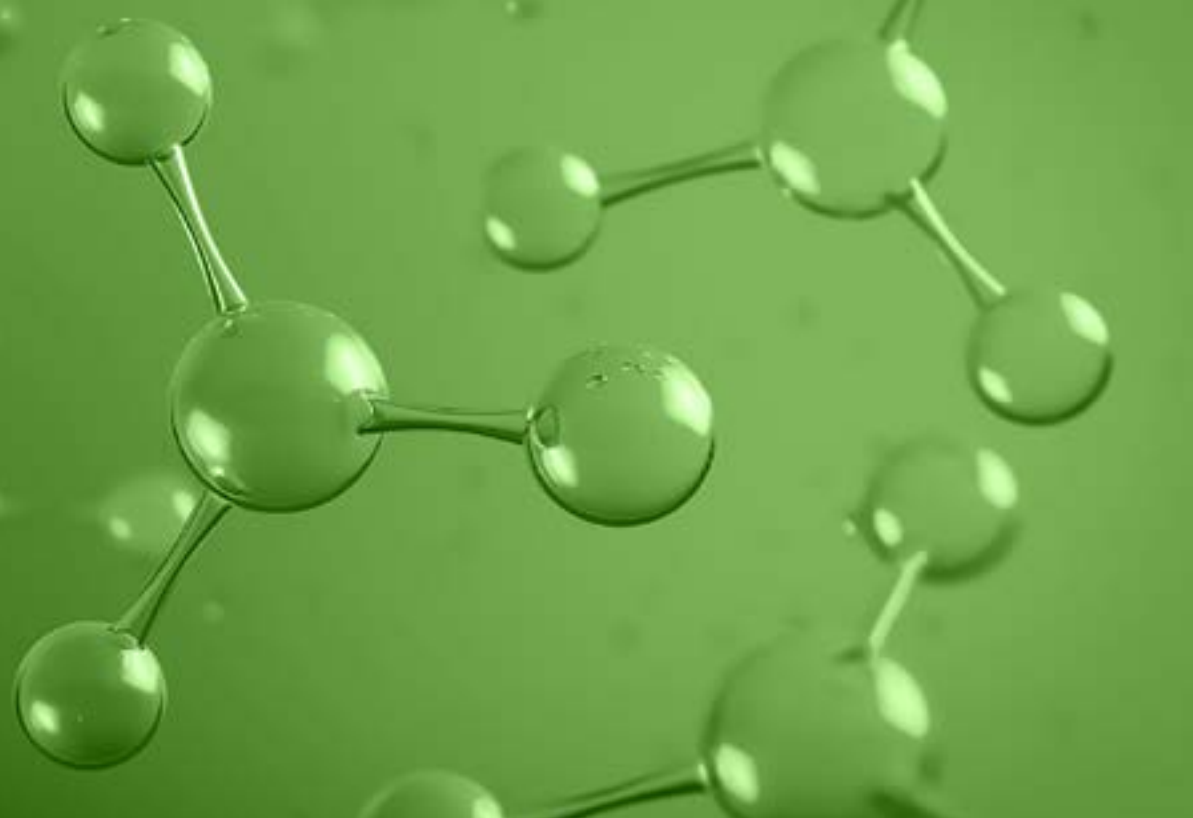
We'll see other advancements in dental technology as we tour SprintRay with its president and Caltech Associates board member Erich Kreidler. He will show us the company's inventions, including a 3D printer that allows dentists to create custom crowns for patients while they wait.

NEW YORK CITY

President's Circle Dinner

Tuesday, November 14, 2023, 6:00 pm ·
Hosted by Caltech Associates President
Tracy Fu (BS '92) and Sharon Wee

In celebration of their generous support of Caltech, President's Circle Associates members are invited to enjoy an intimate dinner in Tracy and Sharon's home, where President **Thomas F. Rosenbaum** will share news about recent Institute successes.



PASADENA

Fueling Tomorrow

Thursday, November 30, 2023, 6:00 pm

Ammonia has been a transformational fertilizer source for more than 150 years, supporting the food supply for billions of people worldwide. It also has untapped potential as a fuel source for combustion engines. However, the industrial process of creating ammonia is costly in terms of its environmental impact, consuming up to 5 percent of the world's natural gas production. Technologies are needed to produce ammonia more sustainably using renewably sourced energy.

Jonas Peters, the Bren Professor of Chemistry and director of the Resnick Sustainability Institute, and his team at Caltech are developing new methods for producing ammonia from atmospheric nitrogen through a process known as nitrogen fixation, ultimately driving towards a process akin to artificial photosynthesis. Such a method, if scalable, would have profoundly positive impacts on both food (via fertilizer) and fuel production. Professor Peters will talk about this research and the progress a collaborative, multidisciplinary team at Caltech is making toward the goal of efficient and sustainable ammonia production with generous support from the Resnick Sustainability Institute.

PASADENA

Holiday Luncheon

Thursday, December 14, 2023, 12:00 pm ·
The Athenaeum

Our annual holiday luncheon is an opportunity to gather with faculty, friends, and fellow Associates in the ambiance of The Athenaeum's cheerful decor.

This year, we are delighted to welcome **Laurie Leshin** (MS '89, PhD '95), Caltech vice president, director of the Jet Propulsion Laboratory, and Bren Professor of Geochemistry and Planetary Science as our special guest speaker. The distinguished two-time alumna and the first woman to serve as director of JPL will update us on the latest developments there.

Happy New Year! 2024

NORTHERN CALIFORNIA

President's Circle Dinner

January 2024

President Thomas F. Rosenbaum and **Professor Katherine T. Faber** will visit the Bay Area to celebrate President's Circle members and their generous support of Caltech and share recent Institute highlights.



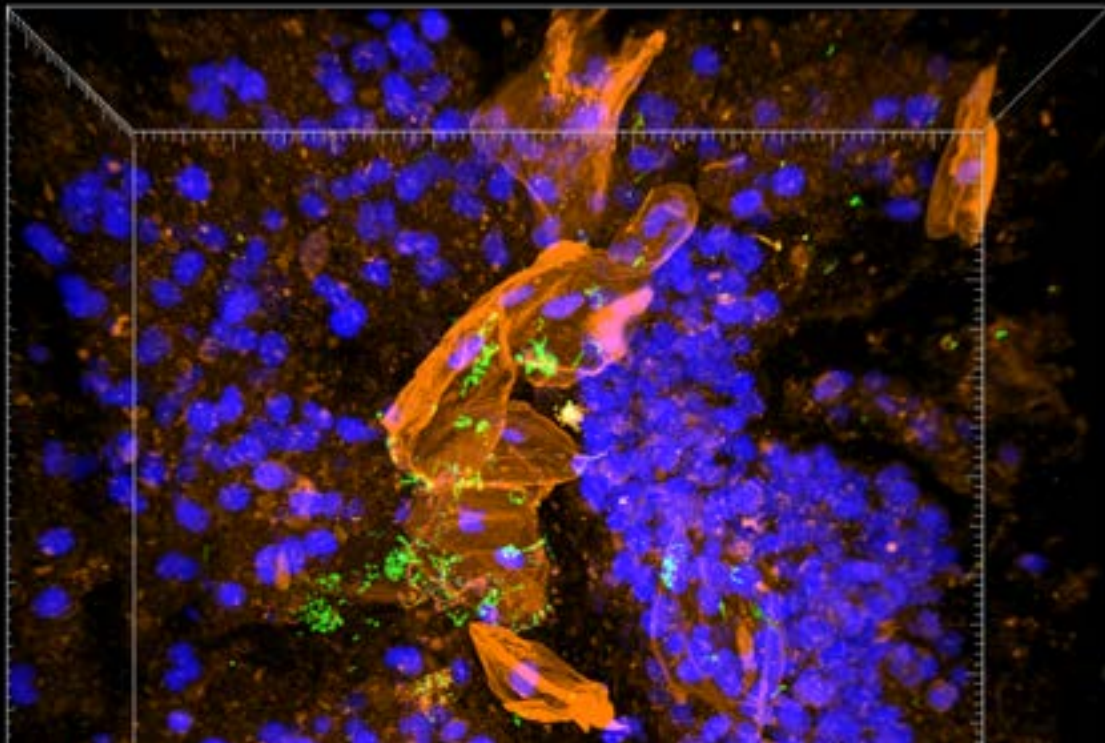
PASADENA

Restoring Ability with BMIs

Tuesday, January 16, 2024, 6:00 pm · Chen Institute for Neuroscience

Spinal cord injuries at the level of the neck can lead to tetraplegia, the loss of movement and feeling in all four limbs. Brain-machine interfaces (BMIs) can help people with tetraplegia by allowing them to control assistive devices with their thoughts. A BMI consists of tiny electrodes that can record the activities of large numbers of cortical neurons, together with machine learning algorithms that can interpret the person's intent based on neural activity. Electrical stimulation through electrodes implanted in the sensory cortex can also restore the sense of touch.

Richard Andersen, Caltech's James G. Boswell Professor of Neuroscience and director of the T&C Chen Brain-Machine Interface Center, will describe the novel approach to BMIs his research team and collaborating colleagues have used: implanting electrodes in a variety of specialized cortical areas rather than just the motor cortex. Using this approach, study participants can control robotics and computers that have enabled them to drink a beverage, play a computer piano, use software, drive an automobile, feel touch using previously insensate hands and arms, and even decode speech, including silent internal speech, and the actions of others they observe.



MiPACT-HCR, a tissue-clearing technique designed for bacterial retention and identification, was applied to a sputum sample from a cystic fibrosis patient. *Streptococcus* (green) aggregated around host cells stained with WGA lectin (orange). DAPI staining (blue) shows host cell nuclei.

ORANGE COUNTY / SAN DIEGO

Controlling Chronic Infections

Thursday, January 25, 2024, 6:00 pm

Unlike animals and plants, bacteria can eat and respire an extraordinary range of substrates. Understanding this defining feature of bacterial biology is both intellectually fascinating and practically important, as insights into the metabolism of bacteria can be leveraged to control their growth.

Dianne Newman, the Gordon M. Binder/Amgen Professor of Biology and Geobiology, will tell us how her team built upon knowledge of bacterial anaerobic respiration to develop a new strategy to treat chronic infections of the opportunistic pathogen *Pseudomonas aeruginosa*. Among the most virulent and antibiotic-resistant pathogens, this bacterium is commonly found in wound infections including those associated with implanted medical devices such as catheters and ventilators. Professor Newman will describe a journey that began in the lab with a “crazy hypothesis” that has now reached a stage where it has the potential for exciting real-world applications.

Travel



Hidden Treasures of Italian Libraries

October 4 to 13, 2023

Rob Phillips, the Fred and Nancy Morris Professor of Biophysics, Biology, and Physics, will be our faculty guide on an exquisite tour of Rome, Florence, and Turin featuring the hidden treasures of Italian libraries, a feast not only for book lovers, but also for art, history, and architecture enthusiasts.

Great American Solar Eclipse

April 5 to 9, 2024

Travel to the Texas Hill Country to witness a rare total solar eclipse with our faculty guide **Mike Brown**, the Richard and Barbara Rosenberg Professor of Planetary Astronomy, holder of the Terence D. Barr Leadership Chair and director of the Caltech Center for Comparative Planetary Evolution.



Galápagos Expedition

August 23 to September 1, 2024

If experiencing the place that inspired Charles Darwin is on your wish list of life travel adventures, then this expedition to the Galápagos Islands is authentic wish fulfillment. Leading us on this adventure is faculty guide and Galápagos expert **Rob Phillips**, who will also host a “DNA bootcamp” in a laboratory on campus prior to the trip.



CaltechAssociates

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