Applications Open for the Norris-Richards Undergraduate Summer Research Scholarships

Call for Nominations for James Flack Norris Award

Landmark Designation for First Use of Radioiodine

Skydiving Into Retirement

Featured Speaker: Jacqueline K. Barton, 2021 Theodore Richards Award Winner
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Cover: Jacqueline K. Barton, 2021 Theodore Richards Award Winner

Editorial Deadlines: April 2022 Issue: March 1, 2022
May 2022 Issue: April 1, 2022
ABSTRACT

My laboratory has focused for many years on understanding electron transfer chemistry through DNA. Double helical DNA provides a medium for efficient redox chemistry over very long molecular distances. But we have learned that this redox chemistry depends sensitively upon DNA base pair stacking; any perturbation in DNA stacking, such as occurs with base mismatches, lesions, and protein binding, turns off the efficient electron transfer chemistry through the base pair stack. Thus this DNA charge transport chemistry depends sensitively upon the integrity of the DNA duplex. We have also been exploring how this chemistry may be used within the cell. Increasingly, iron-sulfur clusters are being found in DNA-binding proteins involved in genome maintenance. These metal clusters, common redox cofactors, are associated not only with DNA repair proteins but also proteins involved in DNA replication, including our DNA polymerases. We will describe studies to characterize DNA-mediated charge transport chemistry by these metalloproteins. Experiments indicate that this chemistry may provide a first step in how DNA repair proteins find their target lesions. Moreover, this chemistry offers a means to facilitate the hand-off between replication proteins, providing a redox switch to control DNA binding. This redox chemistry at a distance, mediated by the DNA helix, thus offers a route for long range signaling and coordination of DNA-processing proteins across the genome.

The 1,011th Meeting of the Northeastern Section of the American Chemical Society

2021 Richards Award Medal Meeting

Thursday, March 10, 2022
Harvard University – Loeb House
17 Quincy Street, Cambridge, MA

Link to Register:
https://www.eventbrite.com/e/2021-richards-award-medal-meeting-honoring-jacqueline-k-barton-tickets-273479694127
A link to watch via Zoom remotely will be provided.
Deadline for in-person meeting registration is March 1st!

Meeting Agenda:

4:30-5:30 Board Meeting
5:30-6:00 Reception
6:00 Dinner and Richards Medal Award Ceremony

Ceremony:

Carolyn Mulrooney, NESACS Chair, Presiding
Reflections on Theodore William Richards
Introduction of the 46th Richards Medalist
2021 Richards Medalist

Jacqueline K. Barton, the John G. Kirkwood and Arthur A. Noyes Professor of Chemistry and Chemical Engineering at the California Institute of Technology.
For more information: https://www.its.caltech.edu/~jkbgrp
Title of Address: Signaling through DNA
**Dr. Barton** will be the 46th recipient of the biennial award, which was established in 1928. The award and its accompanying medal honors the first U.S. winner of the chemistry Nobel Prize in Chemistry; other recipients of this prestigious honor include 11 Nobel Laureates and other scientific luminaries.

The public is invited – reservations are required.

Please visit [www.nesacs.org/awards_richards-medal.html](http://www.nesacs.org/awards_richards-medal.html) for more information on the selection process, the history of the Award and the career of Theodore William Richards, as well as additional information about Professor Jacqueline Barton. Professor Barton's biography can also be found on the NESACS site.

NESACS would like to thank the Theodore William Richards Medal Committee of NESACS, especially Professor Mary Jane Shultz (Tufts University, Chair of the Award Committee) and Ms. Anna Singer for her assistance with arrangements and invitations to this event.

Questions? Please contact: Ms. Anna Singer during standard business hours, [secretary@nesacs.org](mailto:secretary@nesacs.org).

**Registration is required** and a ticket will be necessary for admission to the networking reception, and the board meeting. MBTA closest stop is Harvard Square, with many bus lines (1, 68, 83) providing access via Mass Ave. or Broadway. Please visit [www.mbtacom](http://www.mbtacom).

Garage parking is located on Felton Street (1.5 block NE of 20 Quincy) as well as the Holyoke Street garage, between Holyoke and Dunster streets (5 blocks West of 20 Quincy). There is street parking around Harvard Square, but the 2 hour time limit might not be enough for the dinner or the meeting.

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**Biography:**

Among Dr. Barton’s outstanding achievements is her pioneering application of transition metal complexes to probe the recognition and reactions of double helical DNA. Significantly, through the use of her metal complexes, she has carried out studies that elucidate electron transfer chemistry that involves the DNA double helix, and have shown that this chemistry is a powerful means for long range DNA-mediated signaling. The work has provided a basis for the development of sensitive nucleic acid sensors, as well as for understanding the chemistry underlying DNA damage, repair, and replication. Dr. Barton has been a dedicated mentor, and has trained more than 100 postdoctoral associates and students. Many women and men from her laboratory have moved into prominent positions in academia and industry. As a result of this research, she has been recognized with numerous awards, including the Alan T. Waterman Award from NSF, the ACS Award in Pure Chemistry, and a MacArthur Foundation Fellowship. She has been elected to the American Academy of Arts and Sciences, the American Philosophical Society, the National Academy of Sciences, and the National Academy of Medicine. In 2011, Dr. Barton received the 2010 National Medal of Science from President Obama, and, in 2015, received the ACS Priestley Medal.
Targeted protein degradation (TPD) is a new powerful therapeutic modality which harnesses the body’s natural cellular recycling machinery—the ubiquitin proteasome system (UPS) – to break down or degrade unwanted proteins. This presentation will highlight the discovery and medicinal chemistry optimization of a series of novel orally bioavailable degraders that target the simultaneous degradation of both IRAK4 and IMiD substrates, including Ikaros and Aiolos. These efforts culminated in the identification of KT-413, a heterobifunctional degrader currently being evaluated in Phase I clinical trials. A detailed description of the preclinical pharmacokinetic/pharmacodynamic/efficacy relationships associated with KT-413 will also be described.

Featured Presentation

**Discovery and Characterization of IRAKIMiDs: Degraders Targeting Both IRAK4 and IMiD Substrates for Oncology Indications**

By Matthew Weiss

Organized by the Medicinal Chemistry Section of the Northeastern Section, American Chemical Society

Thursday – March 17th, 2022, 4:00 pm

Register for the February Webinar meeting at:
https://american-chemical-society.zoom.com/webinar/register/
WN_TGl378c_To2s4-pdHZr4aA

Visit: www.nesacs.org/medchem.html

Featured Speaker:
**Matthew Weiss,** Kymera Therapeutics

**Biography:**
Matt earned his BA from Bowdoin College in 1997 before moving to Yale University where he worked on the total synthesis of the welwitindolinone family of alkaloids in the lab of Prof. John Wood. Subsequent to his PhD, Matt conducted an NIH post-doctoral fellowship at the University of California, Irvine with Prof. Larry Overman working on the synthesis of polypyrroloindolines. Matt spent 13 years at Amgen in Cambridge, MA where he focused primarily in the areas of Oncology and Neuroscience, delivering development candidates within both. In 2018, he moved to Kymera Therapeutics, where he now serves as Head of Medicinal Chemistry. In his time at Kymera, he has been involved with numerous development candidates, a subset of which are currently being evaluated clinically.
The Norris-Richards Undergraduate Summer Research Scholarships

March 25, 2022 Deadline

The Northeastern Section of the American Chemical Society established the James Flack Norris and Theodore William Richards Undergraduate Summer Scholarships to honor the memories of Professors Norris and Richards by promoting research interactions between undergraduate students and faculty.

Research awards of $3500 will be given for the summer of 2022. The student stipend is $3000 for a minimum commitment of ten weeks of full-time research work. The remaining $500 of the award can be spent on supplies, travel, and other items relevant to the student project.

Institutions whose student/faculty team receives a Norris/Richards Undergraduate Summer Research Scholarship are expected to contribute toward the support of the faculty members and to waive any student fees for summer research. Academic credit may be granted to the students at the discretion of the institutions.

Award winners are required to submit a report (~5-7 double-spaced pages including figures, tables, and bibliography) of their summer projects to the Editor of The Nucleus by November 1, 2022 for publication in The Nucleus. They are also required to participate in the Northeast Student Chemistry Research Conference (NSCRC) in April 2023.

Eligibility:
Applications will be accepted from student/faculty teams at colleges and universities within the Northeastern Section. The undergraduate student must be a chemistry, biochemistry, chemical engineering, or molecular biology major in good standing, and have completed at least two full years of college-level chemistry by Summer, 2022.

Criteria for Selection:
- **scientific merit** - important factors include the originality of the project, the depth of the investigation, the significance of the scientific questions you pose, and the methods you propose to use.
- **feasibility** - evidence must be provided to demonstrate that the project can be completed by you in the time available and with the facilities at your disposal.
- **preparation** - your academic record, your ability to handle the project, and the background study you have made on your research problem will be taken into consideration.
- **commitment** - the depth of your commitment, and that of your department, faculty, and institution to independent research as a vital component of science education will be assessed.

Application for 2022:
- Announcement Letter
- Instructions
- Student Application Form
- Faculty Information Form

Application available at https://www.nesacs.org/award/norris-richards-undergraduate-summer-scholarship

Completed applications are to be received by the Chair of the Selection Committee no later than March 25, 2022. Please note that applications via email (PDF format) are strongly preferred.

Applicants will be notified of the results by email by April 15, 2022, with written confirmation to follow.

Selection Committee Chair:
Professor Jonathan Rochford
Department of Chemistry
University of Massachusetts Boston
100 Morrissey Boulevard
Boston, MA 02125-3393
Email: jonathan.rochford@umb.edu
CALL FOR NOMINATIONS

The 2022 James Flack Norris Award for Outstanding Achievement in the Teaching of Chemistry

Deadline: April 15, 2022

Nominations are invited for the 2022 James Flack Norris Award, which consists of a certificate and an honorarium of $3,000 and is given annually by the Northeastern Section (NESACS). The presentation will take place at a ceremony and dinner in November 2022 and will include a formal address by the awardee.

The Award was established in 1950 by NESACS to honor the memory of James Flack Norris (1871-1940), a professor of chemistry at Simmons College and M.I.T., chair of NESACS in 1904, and ACS President in 1925-26.

Individuals or teams of individuals may be nominated. Nominee(s) should have served with special distinction as teachers of chemistry at any level: secondary school, college, and/or graduate school. With the presentation of the first Award in 1951, awardees have included many eminent teachers at all levels whose efforts have had a wide-ranging effect on chemical education. The recipient will be selected from an international list of nominees who have served with special distinction as teachers of chemistry with significant achievements.

A nomination in the form of a letter should focus on the candidate or candidate's contributions to and effectiveness in teaching chemistry. Curriculum vitae should be included and, where appropriate, a list of honors, awards, and publications related to chemical education. Seconding letters may also be included; these should show the impact of the nominee or nominee's teaching for inspiring colleagues and students toward an active life in the chemical sciences, and attest to the influence of the individual or team's other activities in chemical education, such as textbooks, journal articles, or other professional activity at the local, national, and international level.

The nomination materials should consist of the primary nomination letter, supporting letters, and curriculum vitae. Reprints or other publications should NOT be included. The material should not exceed thirty (30) pages [if individual] and should be submitted electronically in Adobe PDF format through April 15, 2022 to Ms. Anna Singer, NESACS Administrative Secretary secretary@nesacs.org. For more information about the Award including a list of past award recipients, see https://www.nesacs.org/award/james-flack-norris-award.

Questions about the Award or the nomination process should be directed to the Chair of the Norris Award Committee, Dr. Christine Caputo, christine.caputo@unh.edu.

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Advances That Led to Nuclear Medicine Earn Historic Chemical Landmark Designation

Medical Use of Radioiodine by Saul Hertz Helped Lay the Foundation for the Field

By Sophie Rovner, ACS Staff

The development of the medical use of radioiodine (RAI)—a seminal scientific discovery of the 20th century—was honored with the American Chemical Society’s National Historic Chemical Landmark designation. The dedication ceremony for the landmark was held on Oct. 8, 2021. The event took place at Massachusetts General Hospital (MGH) in Boston, where this lifesaving advance by Saul Hertz had its genesis more than 80 years ago and helped lay the foundation for the field of nuclear medicine.

The story began in the 1930s with Hertz, who was chief of MGH’s Thyroid Clinic. At the time, scientists had recently begun producing new radioactive isotopes during basic research. In 1936, Hertz realized it might be possible to make iodine radioactive and to use it as a radiopharmaceutical. He surmised that it could be administered to patients as a source of internal radiation to diagnose and treat diseases of the thyroid, which accumulates iodine.

Soon thereafter, Hertz and Arthur Roberts, a physicist at the Massachusetts Institute of Technology, began preclinical studies with RAI. On March 31, 1941, they administered the first human treatment, using RAI produced at MIT to treat a person with hyperthyroidism, also known as an overactive thyroid. Hertz and others later used RAI to diagnose and treat cancer.

“These advances—and discoveries by other researchers—laid the foundation for the modern field of nuclear medicine,” said ACS Immediate Past President H. N. Cheng. “Radioiodine and other radiopharmaceuticals are now routinely used in diagnostic imaging and treatment of disease, saving and improving the lives of millions of people.”

“In the decades since this landmark work, the techniques and tools used in RAI therapy have been refined and enhanced, but the foundation of this critical therapy has persevered, restoring health and preserving quality of life for those with thyroid disease, including thyroid cancer,” said Gilbert Daniels, codirector of MGH Thyroid Associates.
“Dr. Hertz was a pioneer in the field of therapeutic nuclear medicine and was the first to administer therapeutic doses of radioactive iodine to treat thyroid disease,” said Andrew Scholte, who was chair of the Northeastern Section of ACS when it sponsored the nomination for the landmark. “Today, radioactive iodine remains the preferred diagnostic tool and treatment for hyperthyroidism. This discovery represents an historical moment in the history of medical science, as well as chemistry.”

“My father’s discovery of the medical uses of RAI leaves a dynamic legacy,” said Barbara Hertz, curator of the Dr. Saul Hertz Archives. “New therapies and imaging agents continue to build on his seminal work. In addition to diagnosing and treating thyroid tumors, radiopharmaceuticals are now being used to target many other types of cancers, including neuroendocrine tumors, prostate cancer, metastatic bone cancer, and neuroblastoma, as well as in the palliative treatment of liver cancer.”

This discovery represents an historical moment in the history of medical science, as well as chemistry
-Andrew Scholte, former chair, ACS Northeastern Section

This is the second National Historic Chemical Landmark in Massachusetts. The state’s other landmark celebrates the development of Polaroid instant photography. “In both cases,” Cheng said, “these noteworthy achievements show that chemistry truly is part of our everyday lives.”

ACS established the National Historic Chemical Landmarks program in 1992 to recognize seminal events in the history of chemistry and to increase awareness of the contributions of chemistry to society. Past landmarks include the discovery and production of penicillin, the invention of synthetic plastics, and the works of such notable scientific figures as educator George Washington Carver and environmentalist Rachel Carson.

For more information, visit www.acs.org/landmarks.

 ACS District I director Katherine L. Lee (left) and Anna W. Sromek, 2021 past chair of the Northeastern Section of the American Chemical Society, with a photo of Saul Hertz and the landmark plaque at the dedication ceremony at Massachusetts General Hospital.
Credit: Massachusetts General Hospital Photography

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Have you sat down and thought about what you would do if you had only 5 years to live? Do you have a vision statement for your retirement? On November 20, 2021, Bill Carroll ran a pilot workshop for the NESACS community called “Skydiving into Retirement: Enjoy the Ride and Land Softly”, and he posed these questions to the attendees.

Bill was the ACS President in 2005 and Chair of the Board of ACS from 2012-2014. He has had a highly successful career spanning 37 years and retired as Vice President of Industry Issues for Occidental Chemical Corporation in 2017. He is an Adjunct Professor of Chemistry at Indiana University and is head of Carroll Applied Science. In addition, Bill applies his science-based analytics skills to pop music (see: www.ranking.rocks). He is also a Certified Retirement Coach.

This 3-hour program on planning for retirement was designed by Bill to be an interactive session. Participants were provided with a personal career compass template, starting with exercises to fill out as “pre-work” to bring to the workshop, and leading to a wellness plan to guide them to apply the learnings toward their retirement journey.

Several messages emerged in this workshop.

**Realizing that retirement is a continuum.** It is important to check in at different stages of the retirement process. One might anticipate retiring in 6 months, a year, or several years from now. Bill advised that regardless, planning early for this journey can help people to avoid some of pitfalls that may befall people in retirement, such as the danger of retreating, withdrawing, and losing interest in life. Active personal management or an intervention may be needed to overcome this disengagement.

**Building structure.** We are used to having ~2000 hours a year that are scheduled for us, and as Bill put it, that’s a lot of time for watching cat videos. In retirement we will need to structure our time ourselves, while in traditional employment, much of our time is scheduled. To keep healthy and happy, Bill stressed that it is important to get exercise at an age-appropriate level and to stay connected to our community…and to wear a belt or pants with no elastic waistband at least once a week!

**Pondering tough questions.** Retirement is not a vacation. In the pre-work, attendees were asked to describe their desired retirement life, down to the ideal day and week. Then the questions became somewhat emotional: what would you do if you had 5 years to live? 48 hours to live? What actions would we take, what would we try to accomplish, what would we regret?

**Identifying sweet spots.** Then Bill led the workshop group through exercises to identify what activities would bring the most fulfillment in retirement. What are our top skills? What are we most interested in doing? And what are our most important values? Working through the career compass with Bill, participants were guided to find a sweet spot, in which one identifies activities that overlap values, interests and skills.

**Achieving goals.** Finally, attendees were assigned homework. Keep a dreams or bucket list, set goals and milestones toward them. It is easier to achieve goals via bite-sized milestones. Make a vision statement of 10 words or less and use the retirement wellness plan template to guide yourself through the stages of your retirement journey.
In closing, we share one of Bill’s take-home lessons: prepare for and expect opportunity and surprise, then keep your eyes open.

Have we piqued your interest? “Skydiving into Retirement: Enjoy the Ride and Land Softly” is being offered in conjunction with the Spring 2022 ACS Meeting and Expo as a Career Pathway Workshop, on Monday, March 21, 1-5 PM PT. To register, visit Career Development - American Chemical Society (acs.org) and navigate to the Career Workshops tab.

We highly recommend this workshop for people in any stage of their lives.

But the Sweet Spot in the middle is what we're looking for.

Carroll Applied Science, LLC

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Too few experimental chemists were paying attention to Hückel MO theory in the early 1960s.
The theme of the hybrid meeting, which will be held in Chicago, IL, on August 21-25, is “Sustainability in a Changing World.” Those who wish to submit an abstract will have the option to select a virtual or in-person presentation during the abstract submission process. Visit the meeting website https://www.acs.org/content/acs/en/meetings/acs-meetings/abstract-submission/call-for-abstracts.html for the list of the programming divisions and planned symposia. The deadline for submission of abstracts is Monday, March 14, 2022.
**Calendar**

Check the NESACS home page for late Calendar additions: [http://www.NESACS.org](http://www.NESACS.org)

Note also the Chemistry Department web pages for travel directions and updates. These include:

**Boston College**
https://www.bc.edu/content/bc-web/schools/mcas/departments/chemistry/news-and-notes.html#events

**Boston University**
https://www.bu.edu/chemistry/seminars/colloquium

**Brandeis University**
https://www.brandeis.edu/chemistry/events.html

**Harvard University**
https://chemistry.harvard.edu/calendar/upcoming

**MIT**
https://chemistry.mit.edu/events

**Tufts University**
https://chem.tufts.edu/news-events/events

**UMass Boston**
https://www.umb.edu/academics/csm/chemistry/events

**UMass Lowell**
https://www.uml.edu/sciences/chemistry/colloquia.aspx

**University of New Hampshire**
https://ceps.unh.edu/chemistry/seminars/spring-2022-seminars

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**Notices for The Nucleus Calendar should be sent to:**
Samurdhi Wijesundera,
Email: samu.amameth@gmail.com

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### MARCH 2022

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<tr>
<th>Date</th>
<th>Speaker</th>
<th>Institution</th>
<th>Title</th>
<th>Location/Time</th>
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<tbody>
<tr>
<td>March 1</td>
<td>Prof. Justin Caram (UCLA)</td>
<td>MIT</td>
<td>Exploring the extremes of excitonic photophysics</td>
<td>Room 6-120 3:00 pm</td>
</tr>
<tr>
<td>March 2</td>
<td>Prof. Paramjit Arora (NYU)</td>
<td>Tufts, Pearson P106</td>
<td>Rational design of ligands for protein surfaces and catalysts for amide bond formation</td>
<td>12:00 pm</td>
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<tr>
<td>March 3</td>
<td>Prof. Leslie Schoop (Princeton)</td>
<td>Harvard</td>
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<td>March 7</td>
<td>Prof. Raul Fernandez (BU)</td>
<td>MIT</td>
<td>Understanding Implicit Bias</td>
<td>4:00 pm</td>
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<td>March 8</td>
<td>Prof. Ziad Ganim (Yale)</td>
<td>MIT</td>
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<td>Room 6-120 3:00 pm</td>
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<td>March 9</td>
<td>Prof. William Dichtel (Northwestern)</td>
<td>Harvard/MIT, Pfizer Lecture Hall</td>
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<td>March 10</td>
<td>Prof. Anastassia N. Alexandrova (UCLA)</td>
<td>BC</td>
<td>Dynamic catalytic interfaces: Ensembles of metastable states breaks the rules of catalysis</td>
<td>4:00 pm</td>
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<tr>
<td>March 14</td>
<td>Prof. Steven Lopez (Northeastern)</td>
<td>BU</td>
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<td>11:15 am</td>
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<tr>
<td>March 15</td>
<td>Prof. Heather Kulik (MIT)</td>
<td>MIT</td>
<td>Molecular design blueprints: materials and catalysis from new simulation and machine learning tools</td>
<td>Room 6-120 4:00 pm</td>
</tr>
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</table>

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**March 16**
Prof. Xi Chen (UC Davis)
Chemoenzymatic synthesis and applications of carbohydrates
BC, Merkert, 4:00 pm

**Prof. Adrian Whitty (BU)**
Tufts, Pearson P106, 12:00 pm

**March 17**
Prof. Thomas Manz (New Mexico State Univ.)
The standard atoms in materials framework
BC, Merkert, 4:00 pm

**March 24**
Prof. Yael David (Memorial Sloan Kettering Cancer Center)
Harvard/MIT, 4:15 pm

**March 25**
Prof. Han Zuilhof (Wageningen Univ.)
BC, Merkert, 4:00 pm

**March 28**
Prof. Michael Wasielewski (Northwestern)
BU, 11:15 am

**March 29**
Prof. Guy Bertrand (UCSD)
Carbenes as powerful transition metal surrogates
BC, Stokes S195

**March 30**
Prof. Gregory H. Robinson (Wageningen Univ.)
Harvard/MIT, 4:15 pm

**Prof. Paramjit Arora (NYU)**
Challenges of the real-world applications of catalysis
Tufts, Pearson P106, 12:00 pm

**March 31**
Prof. Michael D. Morse (Univ. Utah)
BC, Merkert, 4:00 pm

Prof. Heather J. Kulik (MIT)
Harvard, 4:15 pm

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“Education is the key to unlock the golden door of freedom”
– George Washington Carver