



BERKELEY LAB

Bringing Science Solutions to the World



**U.S. DEPARTMENT OF
ENERGY**

Office of Science

Nuclear Science Day for Scouts & Other Nuclear Science Outreach Activities

Alan Poon for the NSD Outreach Committee

2025.09.23



NSD Outreach Committee

- Shamsu Basunia
- Raúl Briceño
- Tom Gallant
- Mike Johnson
- David Konyndyk
- Shujie Li
- Alan Poon
- Jennifer Pore
- Emil Rofor

Some history of Nuclear Science Day



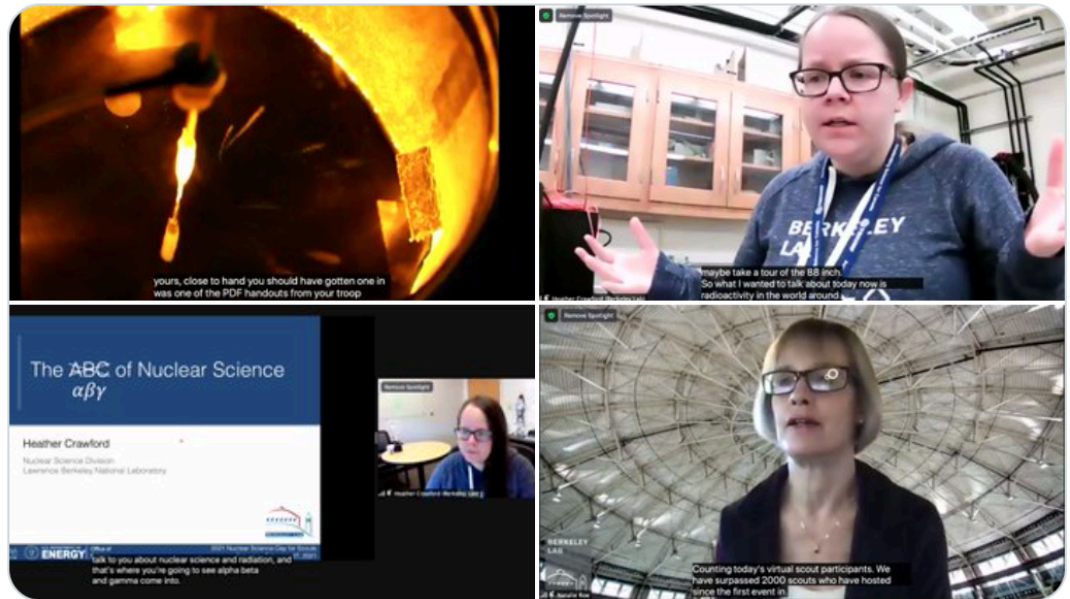
- Around 2011, then LBNL Lab Director Dr. Alivisatos challenged all Divisions to advance his vision of the Lab, including building connections to local communities.
- Then NSD staff scientists Howard Matis (now retired) and Alan Poon proposed for Nuclear Science Division to host Nuclear Science Day for Scouts, a one-day event for youths in the community.
- Matis was a counselor for the Nuclear Science Merit Badge, and advised on the Merit Badge book.
- Overwhelming support – over-subscription >7x in the first year.
- Limit scouts to 8th grade and above in future years.

An “annual” tradition of Nuclear Science Division



An “annual” tradition of Nuclear Science Division

- Years:
 - 2011
 - 2012
 - 2013
 - 2014
 - 2015
 - 2016
 - 2017
 - 2018
 - 2019
 - 2020 (scheduled for 3/21/2020)
 - » Canceled
 - 2021 (virtual)
 - 2022 (Canceled)
 - 2023
 - 2024
 - 2025.10.11



2. IONIZING RADIATION SOURCES

- Study of ionization property of nuclear radiation (alpha, beta, gamma)
 - Alpha - α - helium nucleus
 - Beta - β - electron/positron
 - Gamma - γ - photon quanta

α
 β
 γ

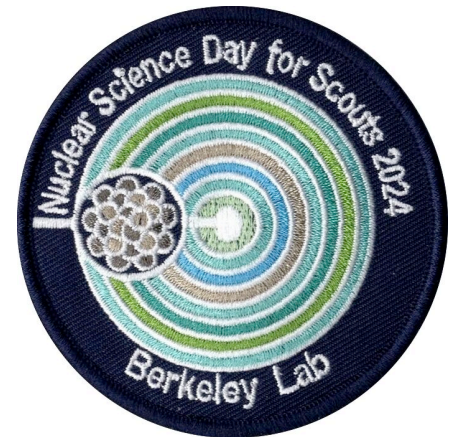
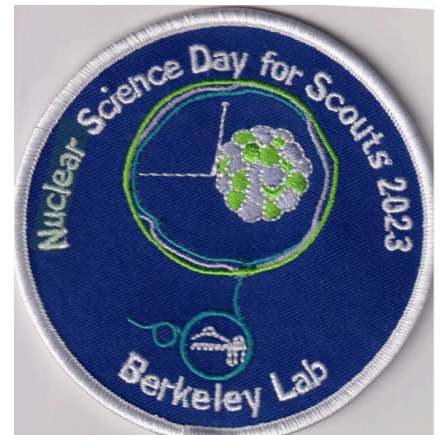
Antoine Henri Becquerel

Remove Spotlight

Paul Barton

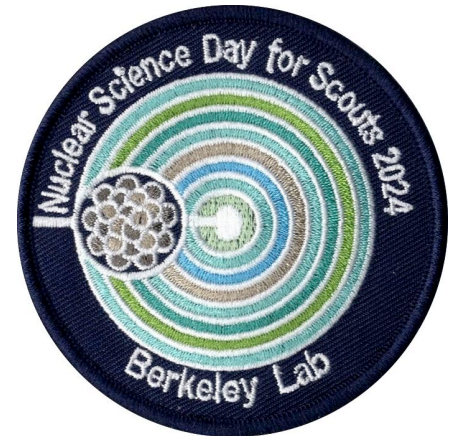
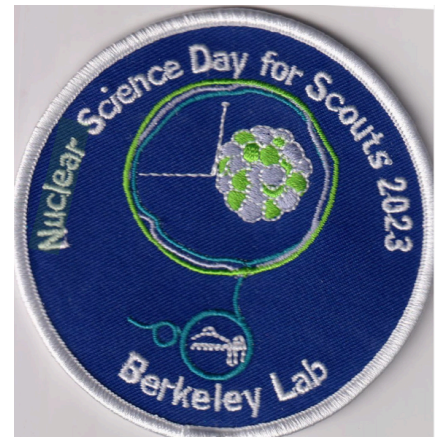
A “Typical” Program

- An “ABC” Lecture
- A lecture on the “theme”
- Tour of an accelerator (88-Inch Cyclotron or Advance Light Source)
- Build an atomic model
- Build an electroscope
- The Radiation Detector Expo
- Understanding everyday activity and training as a radiation technician
- A Career Forum
- A Snickers Bar (frozen by liquid nitrogen at -320°F) Social



A “Typical” Program

- An “ABC” Lecture
- A lecture on **quantum**
- Tour of an accelerator (88-Inch Cyclotron or Advanced Light Source)
- Build an atomic model
- Build an electroscope
- The Radiation Detector Expo
- Understanding everyday activity and training as a radiation technician
- A Career Forum
- A Snickers Bar (frozen by liquid nitrogen at -320°F) Social
- Activities that highlight “quantum.”



INTERNATIONAL YEAR OF
Quantum Science
and Technology

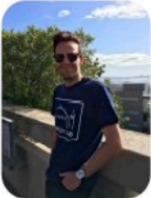


Career Forum (handout from several events ago)



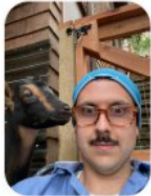
Dahlia An

Dahlia is a Principal Research Associate in the Chemical Sciences Division at LBNL and has worked on projects ranging from decontaminating people after a nuclear incident to treating infections and cancer.



Ren Cooper

Ren is a Staff Scientist and Deputy Head of the Applied Nuclear Physics Program in the Nuclear Science Division. He works on systems for detecting and imaging radiation.



Joey Curtis

Joey is a Senior Scientific Engineering Associate in the Nuclear Science Division integrating cameras, lidar, inertial sensors and gamma-ray detectors into hand-held, drone-mounted and vehicle-based systems to build 3D maps of radioactive isotopes.



Micah Folsom

Micah is a nuclear engineer in the Nuclear Science Division, working on the development of portable radiation sensors used for nuclear security and safeguards.



Rebecca Carney

Rebecca is a postdoctoral fellow in the Nuclear Science Division at Berkeley Lab working on experimental neutrino physics. Her work combines electronics, instrumentation, and data analysis.



Heather Crawford

Heather is a Staff Scientist in the Nuclear Science Division, and works on research to understand the structure of very exotic (short-lived) nuclei. She also works on developing new detectors to make these kind of experiments more sensitive.



Jennifer Doyle

Jennifer is a Mechanical Engineer in the Nuclear Science Division. A lifelong maker, she performs a variety of design, analysis, and fabrication tasks at the Lab to help bring nuclear physics experiments to life as real, tangible, devices.



Joanna Szornel

Joanna is a graduate student at the University of California Berkeley Department of Nuclear Engineering. She conducts research on germanium detectors at Lawrence Berkeley National Laboratory.

Highlights for this year's registration

- Registration opened on July 28, 2025, and closed on September 12, 2025.
 - 403 BSA* Scouts + leaders
 - 23 Girl Scouts + leaders
- Capacity of 50Aud: 236, i.e., we can't fit everybody
- Random draw selected: 225 BSA participants + 29 GS participants (scouts & leaders)
- Experience suggests expecting a few no-show troops
- Registered troops from Alameda, Alamo, Berkeley, Brentwood, Castro Valley, Concord, Corralitos, Crockett, Cupertino, Danville, Fairfield, Fremont, Hayward, Lafayette, Larkspur, Livermore, Moraga, Oakland, Orangevale, Piedmont, Rancho Murieta, Redding, Roseville, San Francisco, San Jose, San Martin, San Ramon, Santa Clara, Saratoga, Sunnyvale, Tracy, Union City, Vacaville, Watsonville

*BSA: Boy Scouts of America. On **February 8, 2025**, its 115th anniversary, the BSA changed its name to Scouting America

This year's sponsors

- Innoview Foundation

The logo for the Innoview Foundation is displayed on a light beige square background. The text "INNOVIEW" is in a bold, sans-serif font, with "INNO" in a light tan color and "VIEW" in a dark olive green. Below it, the word "FOUNDATION" is in a smaller, bold, sans-serif font, entirely in the same dark olive green color.

INNOVIEW
FOUNDATION

This year's sponsors

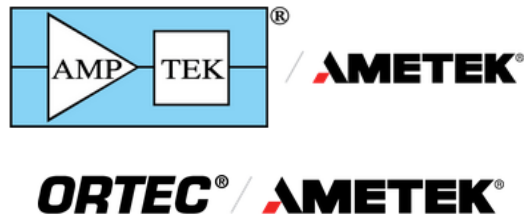
- Innoview Foundation

INNOVIEW
FOUNDATION

- SkuTek Instrumentation

SkuTek
Instrumentation

- AMETEK
 - AMPTEK
 - ORTEC



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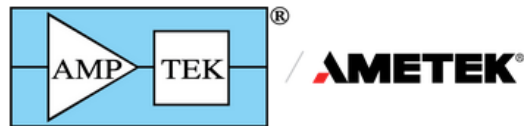


- SkuTek Instrumentation

SkuTek
Instrumentation

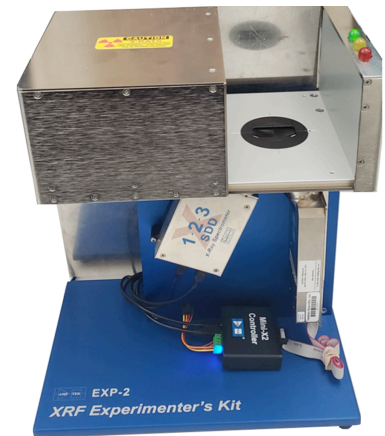


- AMETEK
 - AMPTEK
 - ORTEC



/ **AMETEK**®

ORTEC® / **AMETEK**®



Last year's volunteers

Aleja Biennés, Alisa Bettale, Andreas Scholl, Andrew Jones, Andrew Voyles, Ann-Kathrin Schuetz, Caitlin Youngquist, Chris Rosenstock, Christopher Campbell, Cindy Lee, Damon Todd, Danish Nawaz, David Chang, Dilworth Parkinson, Eduardo De Ugarte, Elina Dluger Rios, Elisa Russier, Emil Rofors, Erich Leistenschneider, Ernst Sichtermann, Faith Dukes, Felipe Ortega Gama, Gianna FazioLiu, Hannah Parrilla, Hans Bechtel, Ina Reichel, Jacari Scott, Jacklyn Gates, Jaime Cruz Duran, Janilee Benitez, Jeff Troutman, Ji Yeon Lee, Julie Drotz, Katrina King, Kenneth Lambert, Kevin Bender, Kushant Patel, Kyra Eyerman, Larry Phair, Ling Liang, Max Smiley, Nick Karki, Noah Bliss, Rebecca Carney, Reynold Cooper, Rita Sadek, Robert Hosbach, Ryan Heller, Samantha Flores-Eulloqui, Sarah McGinn, Shamsuzzoha Basunia, Stephanie Gilbert Corder, Taimoor Hassan, Tina Melie, Vincent Cheung, Wanli Yang, Weronika Wolszczak

We need your help again this year!

Please sign up at:

https://service.lbl.gov/need/detail/?need_id=1131189

With your help, we are making a difference to STEM education



to NuclearScienceDay@lbl.gov ▼

Sun, Nov 19, 2023, 12:37 PM



Hi,

I wanted to let you know that my daughter attended Nuclear Science Day with her troop for about 5 years. Because of her exposure to women in the sciences at Nuclear Science Day, she felt confident majoring in Biomedical Engineering in college. Now she is working on her PhD in molecular biology.

This past weekend, she led the Oregon Health and Science University activity at a Washington/Oregon Girl Scout science festival, introducing about 1000 Girl Scouts to the wonders of science. She was eager to do this because she remembers how important Nuclear Science Day was to her development. I hope you continue this program for scouts because it is making a difference that you may never learn about.

Yours,

S

Other Outreach Activities

Overview

Event Date	Registration Deadline	Description	Location	Duty
10/11/2025		Nuclear Science Day for Scouts	LBNL	various posts at activity stations
10/2025 - 4/2026 (Sundays)	10/24/2025	Data science project mentors for BLDAP 2025-2026	Virtual mostly	Mentors do not need to be data scientists - any experience working with data and data analysis is welcome. Background check and CANRA training required.
10/2025 - 3/2026 (Sundays)		College and career workshops for BLDAP high school students 2025-2026	Virtual mostly	Volunteers to help review college applications, resumes, conduct mock interviews, and more. Background check and CANRA training required.
11/3/2025 - 11/4/2025		Hands-on STEM activities with Bay Area 6th graders	Willard Middle School (Berkeley)	What are Stars Made Of? Microscopic Explorations (Scientific Observations) Circuit Card (Electronics) Chibi Traffic Lights (Coding and Electronics) 8A-12P or 12:30P-3:30P sessions — Those that stay for the full day will receive lunch. K-12 team members will be present to guide the facilitation.
11/17/2025 - 11/18/2025		Presenter for Reverse Science Fair	Longfellow Middle School (Berkeley)	
11/19/2025 - 11/23/2025		National Society of Black Physicists (NSBP) and the National Society of Hispanic Physicists (NSHP) conference	San Jose McEnergy Convention Center	Inquiring whether the Lab is sending Lab Ambassador to the event
11/20/2025 - 11/21/2025	10/17/2025	GEM Fellowship Judge	Virtual	Serve as a judge for GEM fellowship applications. May require offline evaluation. The organization set up virtual meetings in those two days in November to discuss the merits of the applications
3/23/2026		Presenter for Reverse Science Fair	Frick Middle School (Oakland)	
09/05/2025 - 06/15/2026		Project Mentorship: Senior Capstone Engineering at Oregon State University	Remote	A project proposal has been submitted and will be available for selection by this year's Senior Engineering students. If selected, the engagement will last 9 months and will require one hour per week of remote project meetings. The proposal can be found here: https://eecs.engineering.oregonstate.edu/capstone/submission/pages/viewSingleProject.php?id=PqndOkBoFrFEYKd

A Complete List of Opportunities to support the Lab's various offices (Community Relations, K-12, Talent Outreach) at:

<https://service.lbl.gov/need/>

A few highlights

- Be a Mentor (virtual opportunities):
 - [Data science project mentors for BLDAP 2025-2026](#)
 - [College and career workshops for BLDAP high school students 2025-2026](#)
 - [Project Mentorship: Senior Capstone Engineering at Oregon State University](#)
- STEM outreach (in-person):
 - [Hands-on STEM activities with Bay Area 6th graders](#) (Willard Middle School, Berkeley, 11/3 - 11/4)
 - [Presenter for Reverse Science Fair](#) (Longfellow Middle School, Berkeley, 11/17 - 11/18)



- GEM Fellowship Judging Committee: nomination [here](#) (10/17 deadline)
-

National Society of Black Physicists (NSBP) and the National Society of Hispanic Physicists (NSHP) conference

- 11/19/2025 - 11/23/2025, San Jose McEnergy Convention Center.
- The only conference LBNL Talent Outreach will be attending in FY26.
- Hosted by LBNL, SLAC, and LLNL.
- The lab Directors will open with a fireside chat on Friday (11/21) morning from 8:30 - 10:00 am.
- Raúl Briceño plans to host a booth with others from the UCB Physics Department.
- LBNL Talent Outreach will need poster session judges and people to support its exhibit booth on 11/20, 11/21, and Sat, 11/23. **More details to follow.**

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Upcoming Community Events

- **Early Career ERG social hour**
 - Tuesday, September 23rd, 5:30 – 7:00pm
- **LANA In - Person Cafecito**
 - Wednesday, September 24th, 10:00 – 11:00am
- **All Access Mental Health Initiative Monthly Meeting**
 - Wednesday, September 24th, 1:00 – 2:00pm
- **Self Care in Times of Change Lunchtime Workshop**
 - Thursday, September 25th, 12:00 – 12:50pm
- **All Access ERG: National Disability Employment Awareness Month & 10 Year Anniversary Banner Celebration**
 - Wednesday, October 1st, 12:00 – 1:00pm
- **LANA Virtual Cafecito**
 - Thursday, October 2nd, 10:00 – 11:00am
- **AAERG Members Meeting**
 - Friday, October 3rd, 10:00 – 11:00am
- **Neurotypes Accessibility Committee Monthly General Meeting**
 - Monday, October 6th, 11:00am – 12:00pm

Sept 15th - October 15th is Latin American Heritage Month, and [LANA](#) is hosting some coffee hours!

October is also National Disability Employment Awareness Month and ADHD + Learning Disability Awareness Month, so the [All Access](#) ERG also has a lot planned!

The **Shining Lights Program** is accepting nominations until October 31st for advanced graduate students and postdoctoral scholars in mathematical and physical science fields who are women, women-identifying, or who have a demonstrated interest in issues around gender representation in their fields

Add the [Community Events Google Calendar](#) to your calendar

Thank You

Other Outreach Activities/Resources from Nuclear Science and Physics Divisions

ABC of Nuclear Science Website

- <http://abc.lbl.gov>
- Update in progress

The screenshot shows a web browser displaying the "The ABC's of Nuclear Science" website. The browser's address bar shows the URL <https://abc.lbl.gov>. The website has a yellow background with a purple sidebar on the left containing various navigation links. The main content area features a logo at the top, introductory text about the website's purpose, a large infographic titled "Nuclear Science", and a section titled "About the Nuclear Wall Chart" with a list of questions and a PDF link.

Navigation Links (Sidebar):

- Basic Nuclear Science
- Cosmic Connection
- Presentations
- Experiments
- Antimatter
- Make a Nucleus
- Glossary
- Safety
- Credits
- Praise
- CPEP
- Speak With Us
- Boy Scout Merit Badge
- Cloud Chamber
- Guide to the Nuclear Wall Chart
- About the Nuclear Wall Chart
- Privacy and Security Notice
- Other Interesting Sites
- Last updated: February 8, 2017
- Contact Us

Main Content Area:

The ABC's of Nuclear Science

The ABC's of Nuclear Science is a brief introduction to Nuclear Science. We look at **Antimatter**, **Beta rays**, **Cosmic connection** and much more. Visit here and learn about **radioactivity** - alpha, beta and gamma decay. Find out the difference between fission and fusion. Learn about the structure of the atomic nucleus. Learn how elements on the earth were produced. Do you know that you are being **bombarded constantly by nuclear radiation** from the Cosmos? Discover if there are radioactive products found in a grocery store. Do you know if you have ever eaten radioactive food? Find out what materials are needed to shield us from alpha, beta, gamma, radiation. Discover what have we gained by its study.

Nuclear Science

The infographic titled "Nuclear Science" is a complex diagram showing various aspects of nuclear science, including the expansion of the universe, phases of nuclear matter, radioactivity, the nucleus, nuclear energy, and applications. It features a central image of a nucleus and a large, colorful, abstract shape resembling a comet or a particle track.

About the Nuclear Wall Chart

We have brought the [Teacher's Guide to the Nuclear Science Wall Chart online](#). You can find out how we use the nucleus in every day life. Also, There is an extensive description on the effects of radiation in the environment. You can find answers for the following questions:

- Do you want to know about the **modern concept** of the nucleus?
- How nuclear physicists view the nucleus?
- How could anyone **measure something that small**?
- Do you know how we find new elements?
- What are **accelerators** used for?
- What is radioactivity and is it dangerous?
- What do nuclear physicists really do?

We also have a PDF [version](#) for you.

High School teachers and students can find **simple experiments** that can be used in a Chemistry or Physics class. These [experiments](#) can be done in a classroom with inexpensive equipment.

At this site, students and teachers at all levels can learn about the objects that produce the known and identified mass of the Universe. The rest is made of [Dark Matter](#) and [Dark Energy](#) which are science mysteries and are described in other websites.

View the new Phases of Nuclear Matter [diagram](#).

Cosmic-Ray Telescope

- <http://cosmic.lbl.gov>



The screenshot shows a web browser window displaying the 'The Cosmic Connection' website. The browser's address bar shows 'https://cosmic.lbl.gov'. The website has a blue header with the title 'The Cosmic Connection' and subtitle 'The Berkeley Lab Cosmic Ray Telescope Project'. Below the header, there is a photo of two men, one in a striped shirt and one in a yellow shirt. To the right of the photo is a paragraph describing the detector and its educational value. Below this is a section titled 'How to Build a Detector' with a list of links: 'A brief description of the Detector', 'Instruction manual', 'Using the Berkeley Detector', 'Obtaining parts', 'Setting up the detector', 'Join our discussion group on the detector', and 'Interfacing the detector to a computer'. Further down is a 'More Information' section with a list of bullet points detailing various events and publications, including an NPR broadcast, a partial map of detector locations, a talk at the American Physical Society, a presentation at the Seattle Cosmic Ray Workshop, a YouTube video, a URL for a movie, and a group of teachers attending a retreat. There is also a photo of a detector circuit board. At the bottom, there are links for 'For more information on this project, please contact Howard Matis of Lawrence Berkeley National Laboratory', 'Privacy and Security Notice', 'Join our discussion group on the Berkeley Detector', and 'Last modified: May 15, 2019'. On the right side of the website, there is a link 'Go to the ABC's of Nuclear Science'.

The Cosmic Connection
The Berkeley Lab Cosmic Ray Telescope Project

We have a simple cosmic ray detector that can be built by high school teachers. This detector can be used to measure the rate, energy and direction of cosmic rays. It can also measure how cosmic rays vary with elevation. In addition, it is a valuable tool to teach elementary measurement statistics. This unit is part of Berkeley Lab's ABC of Nuclear Science online science unit.

How to Build a Detector

- A brief [description](#) of the Detector
- Instruction [manual](#)
- [Using](#) the Berkeley Detector
- Obtaining [parts](#)
- Setting up the [detector](#)
- [Join](#) our discussion group on the detector
- Interfacing the detector to a [computer](#)

More Information

- On August 25, 2015, NPR [used](#) this detector on its program *All Things Together* to demonstrate how muons can be used to examine the core of the nuclear reactor at Fukushima.
- We have [made](#) a partial map of the places where the detector has gone.
- In April of 2012, we gave this talk to the American Physical Society in honor of 100 years of Cosmic Ray Physics. We have both [PDF](#) and [PowerPoint](#) versions.
- [Presentation](#) to the Seattle Cosmic Ray Workshop
- The Cosmic Connection is [now](#) on YouTube or you can view it from our [site](#) which has an easy to remember URL - tinyurl.com/CosmicConnectionMovie.
- In 2001, a group of teachers attended the High Energy Physics retreat at Snowmass and [measured the flux](#) of muon from sea level to 3.5 km.

Supported in part through the generosity of the [William F. and Edith R. Meggers Project Award](#), [American Institute of Physics](#) and [Sens-Tech](#).

For more information on this project, please contact [Howard Matis](#) of Lawrence Berkeley National Laboratory

[Privacy and Security Notice](#)

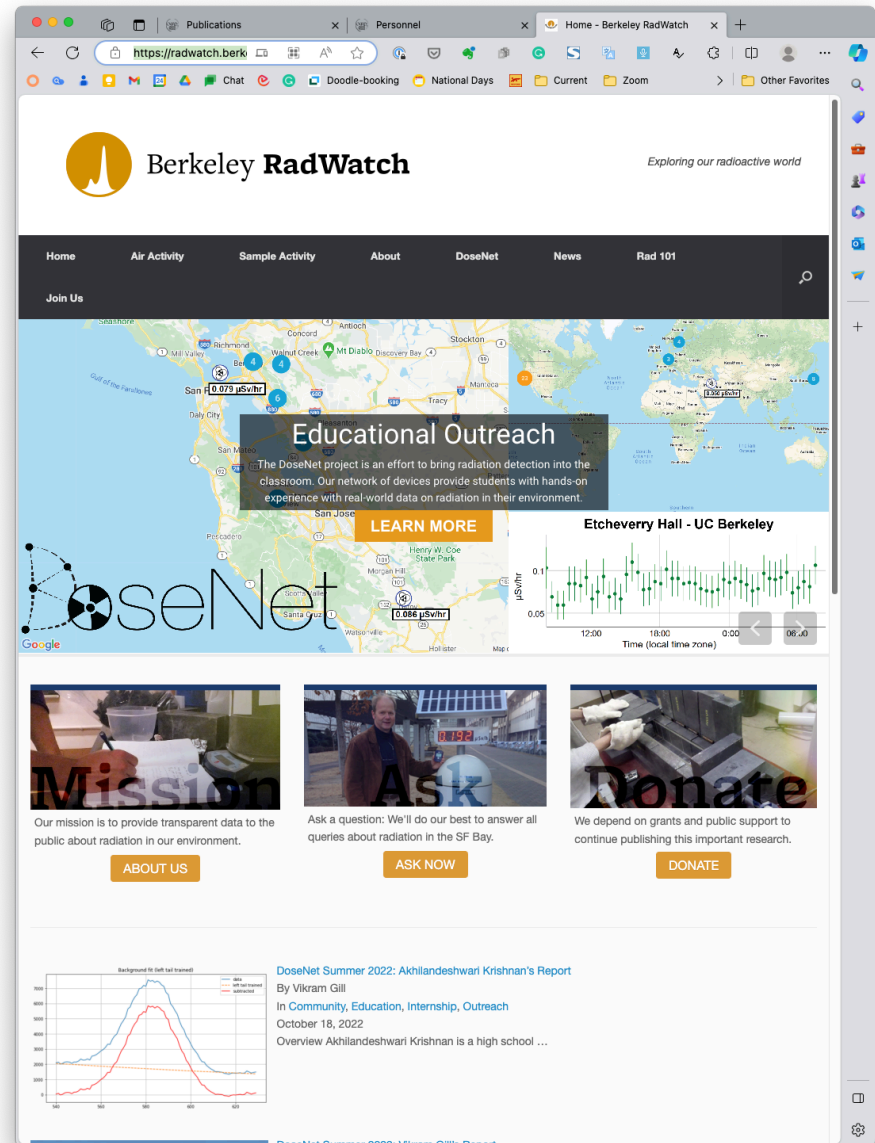
[Join our discussion group on the Berkeley Detector](#)

[Go to the ABC's of Nuclear Science](#)

Last modified: May 15, 2019

RadWatch/DoseNet (with UCB)

- <https://radwatch.berkeley.edu/>



QuarkNet (Physics Division)

- Workshop for high school teachers and students

The screenshot shows a web browser displaying the QuarkNet Workshop website. The browser's address bar shows the URL <https://sites.google.com/lbl.gov...>. The website has a dark blue header with the QuarkNet logo and navigation links: Home, Overview, 2023 Agenda, 2022 Agenda, and More. The main content area features a large title "Physics in and Through Cosmology" and "2023 Workshop" with the dates "June 20 - June 30". Below this, a blue box contains text about the workshop, including details about the schedule, topics, and contact information. To the right of the text are two images: one of a man in a tuxedo holding an award, and another of a man sitting on a stool in front of a cosmic background.

The Physics Division will host its seventeenth "Physics in and Through Cosmology" workshop for high school physics teachers and students . Tuesday June 20- Friday June23 and Monday June 26- Friday June 30 from 10 am – 1 pm. This summer the workshop will be conducted remotely with , teachers & presenters on zoom. The workshop is designed to create a vibrant learning community that embraces diversity, equity and inclusion for Physics teachers and highly motivated high school students with an interest in science, technology, engineering and mathematics (STEM). Teachers and students together, will experience an intense overview of cutting-edge research in particle physics and cosmology, with presentations from Berkeley Lab scientists and postdocs. Topics last year included the Higgs boson and other research with the ATLAS experiment at CERN, neutrino physics, the search for dark matter, mapping the universe, measuring dark energy with supernovae, and machine learning. Students form small groups and interview a lab scientist about the work they are doing, and they present a short video or power point about the scientist's research. A highlight of the last workshop included a discussion with Nobel Laureate Saul Perlmutter . The workshop was in part supported by QuarkNet and organized by Tony Spadafora of the Physics Division and Laurie Kerrigan of Lick-Wilmerding High School in San Francisco. There is no cost to teachers or students.

Students & teachers contact lakerrigan@lbl.gov for an application. Or students can go directly to https://docs.google.com/forms/d/e/1FAIpQLSdv52_lhs3Zkxh3rPi6-rYzLqOXmuRxD2JPumdNLaj-9GPNrA/viewform?usp=sf_link