A publication of The Forum on Outreach and Engaging the Public - A forum of the American Physical Society

Vol. 10 No. 1 March 2025

PHYSICS OUTREACH & ENGAGEMENT

Letter from the Chair

Hello! I'm thrilled to be chairing our Forum on Outreach and Engaging the Public in 2025, the International Year of Quantum (IYQ). As a plasma physicist, I have often felt cordoned off from the rest of physics: we have our own meetings, our own journals, and our own enthusiastic proponents of public engagement. As FOEP Chair, I'm seeing so many common efforts in engaging people in physics we make in our own subdisciplines, and how much we can share expertise to make our efforts stronger. It's wonderful to be at the helm of an organization that can help us all spread understanding and joy about our physics in general.

It's a busy year ahead for FOEP! Soon, attendees of the upcoming APS Global Physics Summit (GPS), the first jointly held March and April meeting, have a lot to look forward to with FOEP and the broader world of public engagement. Look out for the following events between March 15-21 in Anaheim, California:

- **FOEP has two invited sessions on Tuesday**, with April meeting talks by 2024's Nicholson Medalist Don Lincoln and the JNIPER team on informal physics education (APR-G02, Tuesday morning) and March meeting talks by our new FOEP fellows (MAR-J11, Tuesday afternoon), among others.
- **Our annual FOEP business meeting** is on Tuesday evening, an opportunity to connect with others involved in public engagement.
- **We host two contributed sessions on Wednesday**, with APR-P16 co-sponsored with the Forum on Diversity and Inclusion in the morning and MAR-N45 in the afternoon.

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JOIN US

To join FOEP at no cost prior to renewing your APS membership, send an email to membership@aps.org with your request to add FOEP to your membership. Please note that if you currently belong to two or more forums, FOEP will be added at no charge for the remainder of your membership term. On your next membership renewal notice, you will see a Forum subtotal that will include $10 for every Forum membership over two.

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- **Squishy Science Sunday** is a biophysics and soft-matter event bringing scientists and demonstrations to the public. It's the event's second year and FOEP is again a sponsor.
- **LabEscape** is a quantum-themed escape room put on by Paul Kwiat of U. Illinois and partly sponsored by FOEP. Stop by and see how they've rigged two hotel rooms into a massive physics puzzle!
- **Teachers' Day**, an event celebrating IYQ with local Los Angeles teachers, is partly sponsored by FOEP. 40+ teachers are already signed up, but please spread the word if you know of local educators who may want to attend.
- And of course, many events comprising **QuantumFest**, an APS-sponsored celebration of the IYQ. The Quantum Jubilee, in particular, is a free event worth attending on Saturday, May 15.

More broadly, I'd like to recognize the excellent work of the APS Public Engagement team in writing an official statement on the value of public engagement. This statement makes it clear that engaging the public should matter for physicists, both as an imperative for continued investments in our field and also as a way to build identity amongst physicists at all levels. Our forum can be a central part of this field-wide perspective shift. We welcome all of your ideas on how FOEP should cultivate public engagement activities, through sponsoring new efforts, connecting new collaborators, or starting new conversations. We encourage these conversations to play out on our Engage discussion board or by directly reaching out to us on the FOEP Executive Committee.

Of course, a central way to promote public engagement in physics is to recognize those that do it well. Please consider nominating yourself or an exemplary colleague for either the Dwight Nicholson Medal for Outreach or as an APS Fellow through FOEP. The more excellent nominees we receive for these awards, the more that we can highlight activities of all kinds that creatively engage more people with our field. Nominations for both are due by June 2, 2025.

If you're already a member of FOEP, then you're almost certainly communicating physics in some unique way in your own professional and personal lives. I'd love to see our forum grow into a means to learn from each other, to try different methods and audiences and strategies. Thanks for doing what you do, and especially for sharing it with the rest of us.

Frances Kraus, Princeton Plasma Physics Laboratory
2025 Chair of FOEP

Frances Kraus
Princeton Plasma Physics Laboratory

Letter from the Chair, continued

Spotlight on Outreach and Engaging the Public with 2024 Nicholson Medalist for Outreach Winner

This newsletter's spotlight is on the 2024 Dwight Nicholson Medal for Outreach Recipient, Dr. Don Lincoln of Fermilab with the following citation:

> *"For worldwide presentations and publications that educate students and general audiences on the meaning of fundamental scientific research."*

Can you introduce yourself to our readers?

My name is Don. I'm a particle physicist at Fermilab, America's flagship particle physics laboratory. I spend my research time working on the LHC – I'm currently building one of the upgrades – and my side passion is, of course, communicating science to the public.

I'm curious whether you came into kind of the research or the public engagement first, and then how you got involved in the other.

They ran hand in hand. When I was a kid, I benefited from the outreach of previous generations. I went to college, started research; but I always knew there were younger people who would benefit from me paying it forward. So early on as a postdoc, I started giving tours at Fermilab to, usually, middle or high school kids. I was also an adjunct professor for a decade or so, until I realized that I could talk to 15 kids in a class, or I could redirect my output to connect to thousands, tens of thousands, and when I'm lucky, millions. And so I redirected that energy towards larger-scale outreach. I've found that I have a knack for making analogies that are just right enough, or just not wrong enough that they convey as much of the idea as the audience likes, in spite of not being quite perfectly right.

I'd seen your penchant for analogies highlighted in a Google search! What do you think about that balance between helpful and accurate? A lot of physicists don't want to say anything wrong.

There are scientists who suffer from perfection paralysis, meaning they are petrified that one of their colleagues will say, "Well, what you just said didn't apply in 2% of cases." And they'd be right. But when I speak to someone who is a science enthusiast, they are never, ever going to dive down into that 2%. If they come in knowing nothing and walk out knowing 90% of the truth, they have vastly increased their understanding. And as long as they don't go forward thinking that that 90% is 100%, you've done well. You can tell them, well, there's more to it, but this is the big idea. Most people are quite comfortable with the big idea. The question is, does the audience feel more comfortable about the topic than they did coming in? If you have to tell them all of the exceptions, and then the corrections to the exceptions, then they fall asleep.

Dr. Don Lincoln

Fermi National Accelerator Laboratory

Website: https://drdonlincoln.com

Facebook: https://www.facebook.com/Dr.Don.Lincoln/

YouTube: https://www.youtube.com/fermilab

LinkedIn: https://www.linkedin.com/in/don-lincoln-2a703031/

Scientific American: https://www.scientificamerican.com/author/don-lincoln/

You said you'd rather talk to millions than to 15, but that makes it hard to get feedback. How do you know if you're really connecting with your larger audience?

It's true: you don't get feedback as you're making a YouTube video. You have to rely on your own experience. I don't know about you, but whether I talk to an audience or I talk online to a camera, I can generally tell if it's working. Sometimes I miss, but as a general rule, you can sort of feel it. Of course, if you work with a small group, you get more rewarding feedback. But the other side is that science denialism is so big in our society. Beyond gaining an emotional connection with a small group, we need effort to go toward spreading science literacy as broadly as possible. If people don't hear the voices of scientists, they'll only hear the voices of misinformation. So it's imperative that scientists who have a knack for communicating join the public discourse.

I'm sure many reading this newsletter can't help seeing that political side of it. For scientists feeling like there's so much misinformation, what can make our counter-messaging effective?

First, surprisingly, is not to just dump facts on people – that doesn't work. You have to relate to the audience, and you first have to understand where they're coming from. People come to a conversation with a lot of ideas already, right and wrong, and if you just start dumping on them, they shut down. You don't come in scorching the opponents because telling someone they're dumb just doesn't cut it. So what I try to do is just be the voice of reason. Often there will be a public conversation between me and a science denialist. And you know that the denier is not going to ever claim that you won – they're too combative. But the absolutely crucial thing to remember is that your audience is not the person you're speaking to: it's the people watching.

Right. Our culture of two sides always fighting with each other – people do tune out from that.

They do. You're not going to disabuse someone of something they feel strongly. Instead, you can usually find some commonality – well, we both agree on this. Then you can pull them a little bit more towards the center. You have to relieve them of some anxiety, or slowly reduce the anxiety, and that just happens through repetition. The best strategy is to build up a relationship with your audience, where they feel that you're buddies. That buys a lot, and it happens by constantly communicating, talking about some things that do not threaten their worldviews. Then when you get into something that does, they're more inclined to listen.

You were the Chair of FOEP back in 2019. What do you see as the most useful path forward for our forum?

It's hard to build a cohesive thing, especially with rotating leadership. But what I would like to see is a multi-year project that everybody can get behind and stick with. And that's hard. We all do this part time. We can benefit by working with the APS Public Engagement staff, who don't constantly change. But FOEP should pick something and think like an advertiser: how can we maximize the impact and maximize the audience? You've got to build something, focus on it, and make it grow.

Thanks for that – I think it applies to anyone considering a new project for public engagement. Before we go, what are your ongoing projects? What's next for you?

Well, everything. I'm making YouTube videos with a commercial company called The Great Courses. I'm thinking about a new book – and the problem is not with coming up with ideas, it's coming up with an idea that people will read. You need something that breaks out. And the last thing is finding a media niche to write from. I used to write for CNN which worked well: they needed product, I needed a broadcasting platform. But now I'm in the market for a new high-visibility media outlet since that's how you connect to people. I did it for Scientific American for a while, then for Big Think. You know, platforms exist for some time then they redirect. Someone comes in and changes what they do. So you have to constantly reinvent yourself.

Report from the International Year of Quantum Science and Technology Opening Ceremony

February 4th-5th, 2025
UNESCO Headquarters
Contributed by Bellave Shivaram, Chair-Elect, FOEP

The inaugural ceremonies to mark the beginning of the next 100 years of Quantum Science Technology were held at the UNESCO headquarters in Paris, Feb.4-5, 2025. With talks and panel discussions spread over a day and a half the event was both celebratory and educational. The venue was a marvelous auditorium inside the UNESCO Paris, headquarters capable of seating over 600 delegates. Each seating area in the auditorium was equipped with headphones and a microphone. While the scientific talks and panel discussions were in English some of the plenary addresses were in French with real time translation being provided in three separate languages that each delegate could toggle on the headphones. Every successive speaker was welcomed to the stage by a drum roll with the end of each session marked by a musical performance by an electronic music duo "DoppelHandel," adding significance to the celebratory nature of the event.

The American Physical Society was a major sponsor of the event and had by far the largest contingent of delegates. In addition to yours truly, participants from the US were members of the APS governing unit, physicists, chemists, materials scientists and a few students and post-doctoral fellows. There was also a significant presence of members from start-ups and established corporations involved with quantum computing, quantum information, and quantum cryptography. The year 2025 was declared as the International Year of Quantum Science and Technology by a formal UN resolution that passed in June 2024. But it is worth noting that the efforts to make this happen started almost five years ago primarily through the efforts of Professor Cadden-Zimansky from the US. The final resolution that passed was handled by Ghana, with Mexico playing an important role during the seventy-eighth session of the UN as "Agenda item 18" under "Sustainable development."

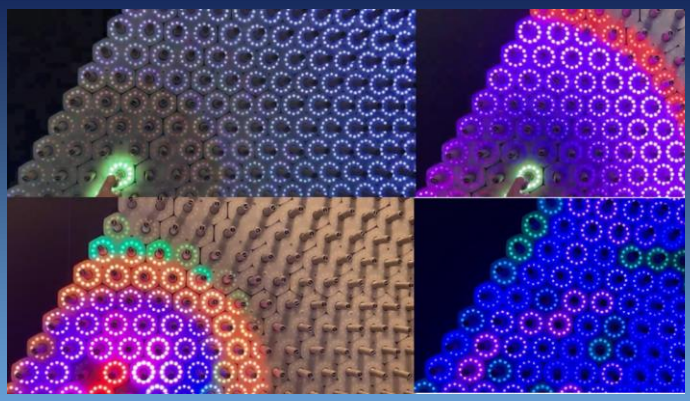
The opening day started with formal remarks by Lidia Brito, UNESCO's Assistant Director-General for Natural Sciences and was soon followed by an excellent historical overview of the development of quantum physics over the last 100 years by Nobel Laureate Anne L'Huillier from Sweden. Although the years 1925-26 saw the most number of papers appearing on the revolutionary ideas of quantum physics Anne reminded us that in fact it started 25 years earlier with the introduction of the concept of quantum of light by Max Planck trying to reconcile experimental results on the spectrum of a black body. In fact, the symbol 'h' the non-zero value of which is inescapable in explaining all quantum phenomena was first introduced by Planck and bears his name today. Two other Nobel Laureates (Bill Phillips from the US and Alain Aspect from France) also spoke at the conference and a consistent message was that there have already been a number of societal benefits that have come out of quantum physics developed over the last 100

The magnificent conference hall at UNESCO, Paris, the venue for the IYQ2025 opening ceremonies.

Part of the US delegation to the IYQ opening ceremonies

developed over the last 100 years (such as MRI, lasers, quantum sensors etc.) but these are based on rather "conventional" aspects of quantum mechanics such as discrete energy levels and wave-particle duality. These applications were part of the "first quantum revolution," but a "second quantum revolution"—based on the counterintuitive ideas of superposition and entanglement—is still to come. "We haven't been putting the weirdness to work yet," Phillips said. What we can foresee in future technologies over the next 100 years or more is the exploitation of the more "unconventional" or non-intuitive aspects of quantum physics such as entanglement and action at a distance. It was mentioned time and again that one should not hype up the possibilities of quantum technology when it comes to interacting with the general public. As an example, while there have been many breakthroughs in the field of quantum computation in the last two years, we still do not have any "useful" general purpose applications for a quantum computer. Nevertheless, enthusiasm for impact of future developments was overwhelmingly shared by everyone attending the event. Even though quantum computers per se might not be immediately useful its "hybridization" with HPC (high performance computing) and AI (artificial intelligence) seems to hold promise. Dr. Rajeed Hazra, CEO of Quantinuum, a US start-up, suggested during a panel discussion that quantum computing could be used to generate training data that is badly needed for AI models.

The quantum divide – that technology should not be solely in the hands of a few nations was also a prominent topic of discussion. Calls were made for making quantum science more inclusive through education at lower levels, collaborations, and outreach.



Quantum Jungle Exhibit: Touching one of the springs (top left) launches an "electron" (bright green light) which propagated throughout the board with the amplitude and phase information of the electron wave encoded in color (other three panels). If a second touch is made at a different point and at a later instant in order to "measure" the electron the wavefunction collapses, to reveal its position (not shown).

Quinnie, the mascot of IYQ2025 developed by Jorge Cham of PHD Comics in collaboration with the APS shown here riding the wave-function.

Yet another highlight of the meeting was the separate space provided for exhibitors with demonstrations and hands-on activities. A first-year graduate student from Germany engaged had an engaging VR (virtual reality) app where you could watch a single photon emitter fire particles at a double slit. Despite the particle nature of the photons one observed on a screen on the other side of the double slit a wave interference pattern build up gradually. Another engaging exhibit also from Germany presented was called the "*Quantum Jungle"*, an interactive art piece which consisted of 100's of half inch diameter springs driven into a vertical board of about 8 ft x 4 ft and illuminated at their base with changing colors. Touching one of the springs launched an "electron" which with the passage of time would spread throughout the board with the amplitude and phase information of the electron wave encoded in color. If you touched a different spring at a later instant in order to "measure" the electron you launched the wavefunction would collapse, but not necessarily at the point you touched, thus revealing its instantaneous position. A final exciting moment at the meeting was the introduction of the IYQ mascot, called Quinnie, designed by Jorge Cham, aka, PHD Comics, in collaboration with APS.

Six FOEP 2025 Mini-Grants Awarded

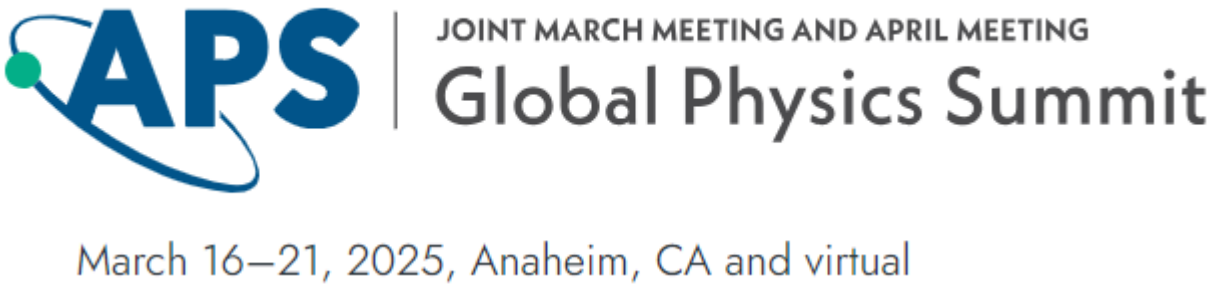
The FOEP mini-grants are intended to encourage and support individual and group projects that promise to bring physics awareness and engagement to their communities and to the public more broadly. Awardees are also expected to present their project and its impact in a FOEP session at an April or March APS meeting or Global Summit.

The six 2025 FOEP mini-grants are

- **From Theory to Reality: Hands-On Photon Entanglement Exploration**, PI: Ajithamithra Dharmasiri, Texas A&M University graduate student
- **Empowering the Next Generation: Inspiring Women and Minorities in Physics through Outreach and Engagement**, PI: Tong Gao, Asst. Prof. Michigan Technological University
- **IceTop Event Viewer: A Summer Student Project for Future Outreach**, PI: Lincoln Draper, University of Utah graduate student
- **Gravitational Waves Explorer: A Beginner's Guide: build a tabletop interferometer**, PI: Rachel Langgin, University of Nevada Las Vegas graduate student
- **Bringing the Cosmos to the Community: A Sidewalk Astronomy & Astrophotography Initiative**, PI: Kenneth Rymanowicz, University of Memphis graduate student
- **Vicksburg STEM Night**, PI: Lucinda Slattery, Army Corp of Engineers

FOEP Mini-Grants are awarded annually with proposals due in December or January.

APS Global Physics Meeting



Mark your calendars if you have not already for the 2025 APS Global Physics Meeting! This will be the joint March and April APS Meeting.

- **When:** March 16th-21st, 2025
- **Where:** Anaheim, California, with a virtual option available
- **Registration:** Early registration is currently open at https://summit.aps.org/attend/registration, with regular registration opening February 1st, 2025. In addition, lowered rates are available for attendees from less-resourced countries.

For additional information, visit https://summit.aps.org.

Features from the APS Committee for Public Engagement (CPE)

Features from the APS Committee for Public Engagement (CPE)

CPE is an APS-appointed committee that advises APS Public Engagement Staff. Though structured differently than FOEP, they share many of our goals.

CPE is conducting a survey on public engagement practices in APS!
Please complete the 5-minute survey and share it with your colleagues.

If you are attending the Global Physics Summit and looking for public engagement sessions to attend, here are the APS Public Engagement sponsored events that might be of interest to you:

Tuesday, March 18

- Building Trust in the Integrity of Science,
  Panel session exploring the topic of trust in science through the lens of research integrity
  (10-11 a.m Anaheim Hilton, Catalina 4)

Wednesday, March 19

- Broaden Your Research Impact Through Innovative Public Engagement,
  Workshop to strengthen your planning for impactful public engagement initiatives
  (10:30-noon Anaheim Hilton, Catalina 4)
- Building your Science Trust Toolkit: Moving from Correction to Connection,
  Interactive workshop to practice useful skills for building trusting relationships
  (2:30-3:30 p.m Anaheim Hilton, Catalina 4)

Thursday, March 20

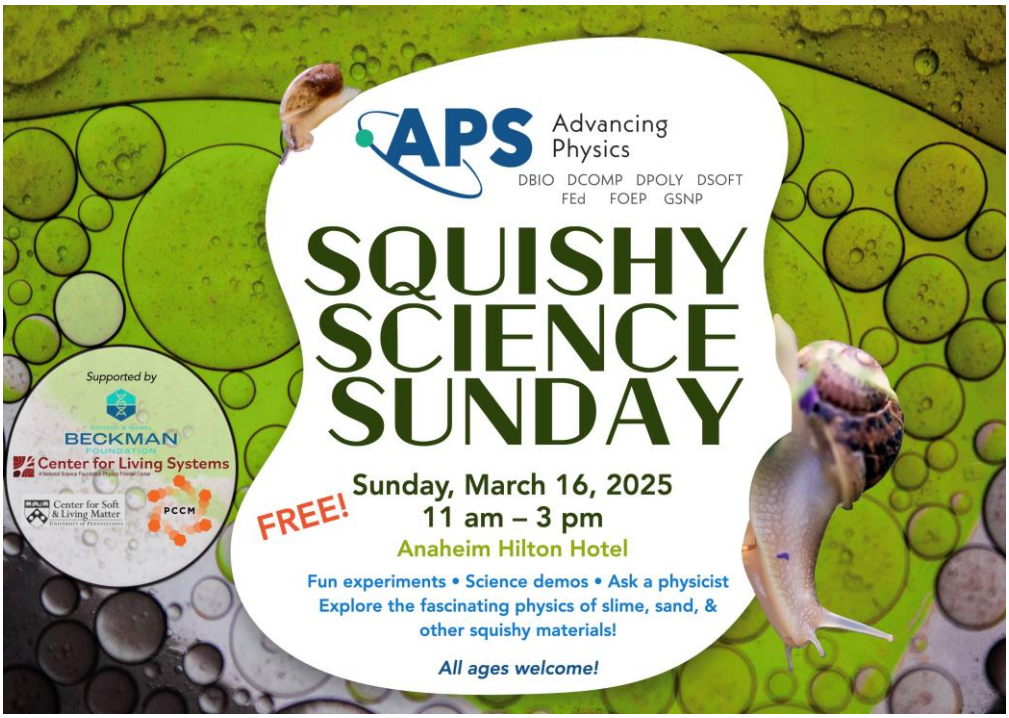
- Art Meets Science,
  Invited session for the Committee on Public Engagement (CPE) on the intersection of art and science
  (8-11 a.m Anaheim Convention Center, 159 (Level 1))
- Strategic Science Communication: An APS Public Affairs Event,
  Science communication workshop on how to communicate the impact of physics to the public
  (11:30-1p.m. Anaheim Hilton, Catalina 7)

Additional PE events (including talks by JNIPER members!) can be found by applying the “Public Affairs” filter to the Summit schedule.

The Committee for Public Engagement wants to hear your thoughts! Please look out for Listening Sessions at the APS Public Affairs booth in the APS Village throughout the Global Physics Summit.

APS Global Physics Meeting

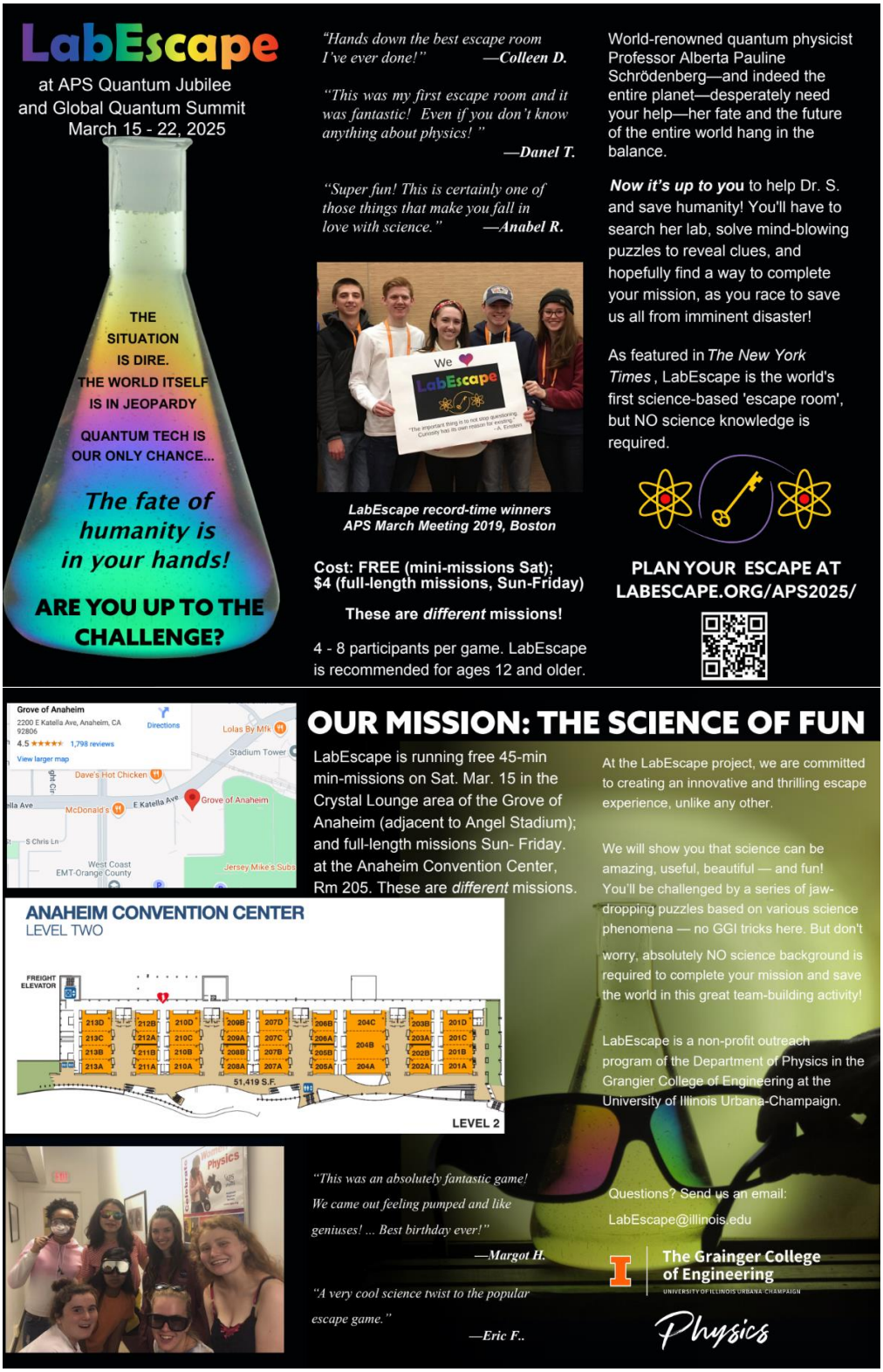
Join us at these events!



Sign up for the Jubilee here.

For more information about International Year of Quantum events at the 2025 Global Physics Summit, see the QuantumFest landing page.

APS Global Physics Meeting



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PHYSICS OUTREACH & ENGAGEMENT

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FOEP Membership – Join Today

To join FOEP at no cost prior to renewing your APS membership, you can get your ID badge scanned at a meeting, send an email to membership@aps.org with your request to add FOEP to your membership, or send a letter requesting membership to APS membership department.