

# PHYSICS OUTREACH & ENGAGEMENT

## Letter from the Chair

Our lives have been upended by the global pandemic, which in turn led to the worst economic crisis since the Great Depression, followed by protests in the summer calling for racial justice. Many are waiting for a vaccine against the novel coronavirus that causes COVID-19, but even if such a vaccine were available today, as you are reading this, our problems would not be over. Recent polls indicate that only 50 – 75% of the U.S. population would agree to be vaccinated against COVID-19, which is well short of the level required to guarantee herd immunity against the virus. [“A Vaccine Doesn’t Work if People Don’t Take It” Phoebe Danzinger, NY Times, July 12, 2020]. The Strategic Plan adopted by the APS last year explicitly supports “member engagement in effective science advocacy and public outreach.” I would argue that it has rarely been more important for APS members in general, and members of FOEP in particular, to participate in science communication, outreach and engagement with the general public.

This issue of the FOEP newsletter features a special Spotlight interview with two masters of outreach, Drs. Ainissa Ramirez and Mark Miodownik, who have each recently published new books for a general audience on an important scientific topic that is often overlooked by those involved in science communication: Materials Science. This is a topic that touches us all in multiple ways throughout our days, and yet there is a shortage of popular science books devoted to this field. As Ainissa Ramirez puts it in her new book, *THE ALCHEMY OF US*, “materials science is a bit like my home state of New Jersey, because it is wedged between two more well-known entities.” For the Garden State it is New York and Philadelphia, while for materials science it is physics and chemistry. Dr. Ramirez uses historical narratives to explain how the development of prosaic materials, such as glass, steel and carbon filaments have transformed society. We make the materials, and in turn, the materials make us. Dr. Ramirez’ book, by emphasizing the human stories that underlie scientific advances, forcefully makes the argument for diversity and inclusiveness. As Dr. Miodownik said in

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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](mailto: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.

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

his review in Science magazine: “If you want to understand how cultural values, including racism, get baked in the materials we create – the MUST read is THE ALCHEMY OF US by Anissa Ramirez.”

Mark Miodownik is a professor of Materials and Society at University College London and the author of the 2014 best seller STUFF MATTERS and last year’s LIQUID RULES. In both he demonstrates how fascinating physics and chemistry (there they are again) combine to make the materials that surround us, without which our lives would be poorer and harder. In STUFF MATTERS each chapter began with the same photo of the author having a cup of tea at a small table on his building’s roof, followed by a discussion of one of the materials found in the photo, such as steel, glass, paper and plastic, while in LIQUID RULES Prof. Miodownik uses the framing device of a transatlantic flight, with each chapter featuring the different types of fluids he encounters. The science of jet fuel, liquid soap, liquid crystal displays, glues (did you know that aircraft are held together with glue, and not rivets?), ballpoint pens and the origin of jet aircraft contrails, are all discussed on this long but never boring flight. I am thrilled that we have both authors in the Spotlight section, in a virtual APS meeting panel that didn’t happen this year (but maybe next?). One can only hope that as more people see how physics operates in their everyday lives, they will form an appreciation for science and the scientific method.

FOEP was set to host a public event at the March 2020 APS meeting that promised to highlight the challenges of science communication in what we hoped to be a fun and engaging manner. Inspired by the book Thing Explainer: Complicated Stuff in Simple Words by Randall Munroe (creator of xkcd.com), the THING EXPLAIN YOUR RESEARCH contest asked APS March Meeting participants to translate the title of their talk using ONLY the one thousand most common words in English as found at <https://splasho.com/upgoer5/>. A panel of judges would then try to determine which of three actual talk titles corresponds to the THING EXPLAINED translation. We received many excellent submissions on our web site, and as we were making the difficult decisions as to which submissions to include in the evening public event, the entire meeting was called off. But we couldn’t let these great submissions just languish – so in this newsletter you’ll find the first annual (maybe?) THING EXPLAIN YOUR RESEARCH QUIZ. Now you can be the judge and see how easy or hard it is to match the “Thing Explained” physics title with the one that appeared in the APS program. At least one of the entries is a haiku, while another calls to be sung aloud!

The challenges of the quarantine and virtual meetings, seminars and lectures highlights the importance of innovative and creative physics outreach efforts. Let us know what you have been doing, what’s worked and what hasn’t, and what APS can do to help. COVID-19 will pass eventually, but the need for public engagement with physics will remain.

James Kakalios



James Kakalios  
University of Minnesota  
- Minneapolis

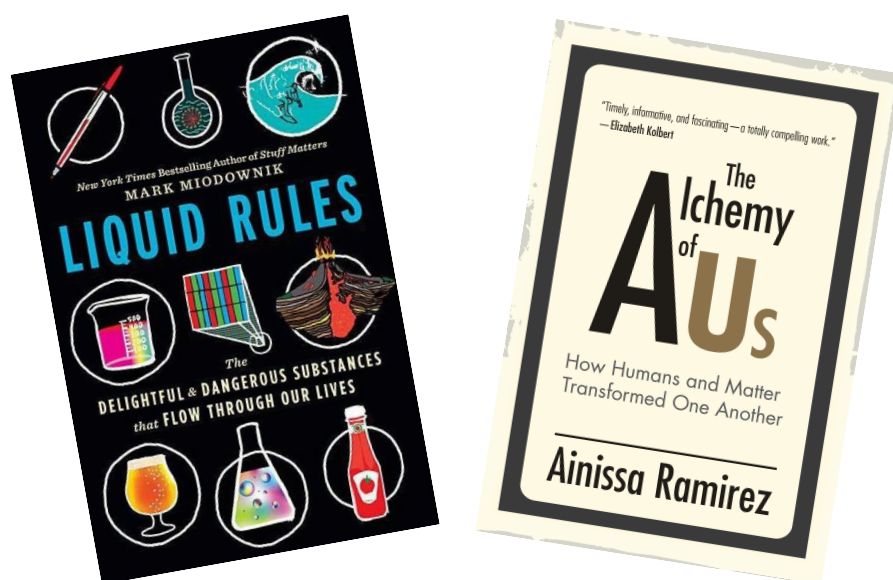
## Letter from the Chair, continued

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## Spotlights on Outreach and Engaging the Public with Ainissa Ramirez and Mark Miodownik

Questions and Answers with Ainissa Ramirez and Mark Miodownik, both material scientists, authors, and experts at outreach and engaging the public.

We posed the same questions to these two very talented people. Their responses are below. Enjoy!



Ainissa Ramirez

<https://www.ainissaramirez.com>



Mark Miodownik

<http://www.markmiodownik.net>

### Q: What inspired you to do the outreach you do?

Ramirez:

Ever since I was a little girl I wanted to be a scientist. I got the idea from a television program. Back in the 1970s and 80s, I loved shows like *Star Trek*, *The Bionic Woman* and *The Six Million Dollar Man*. But the show that really put me on the path to becoming a scientist was a PBS show called *3-2-1 Contact*. In it, there was a repeating segment, which had a black girl solving problems with her friends. When I saw her, I saw my reflection.

The reason why I do outreach is because science literacy is one of the most important issues of our time. Science touches everything in our culture from climate change to evolution to data privacy. Yet, most people don't have a good relationship with science, commonly from a bad experience with it. This poor relationship has societal consequences, because a population that feels detached from science is destined to make

*Continued on page 4*

uninformed decisions. The reason why I do science outreach is because I want to break this cycle and I want to push back against the anti-science thrust stirring in our midst. From my own experience, I have learned that one of the best ways to form a connection to science is in seeing one's reflection in it. It goes without saying that we need to address the stereotype of white males in white lab coats, so that more folks can feel included in science. As such, I do science outreach to be that reflection to those who have been overlooked and those who may have had a bad experience with it. I do outreach to shatter that stereotype and to encourage people of all stripes that science is for them, just like *3-2-1 Contact* did for me.

Miodownik:

Popular science is like pop-music, it allows readers to be part of the enjoyment and vibrancy of modern culture. It also inspires new people, hopefully an increasingly diverse set of people, to take part in science. This is particularly important for branches of science that are less well known to the public, such as materials science. The ages of civilisation are named after materials, such as the stone age, the bronze age and the iron age, which shows that the development and understanding of materials is an ancient practise. Yet despite being so fundamental to civilisation and the development of the other newer sciences such as physics and chemistry, it is relatively unknown to the public. I got into outreach to do something about this. Materials science is a synthesis science in that it rejects reductionism: materials cannot be understood solely from knowledge of their constituent parts. This gives it a modern outlook and an increasing relevance to how technology and other aspects of modern culture shape us. My goal is to help the public appreciate this central role of materials in their lives.

**Q: Story telling - you both are extremely good at it. I love science and I love reading about science, both research papers and the general outreach articles. The small amounts I have read from each of your works show that you not only have a knack for delivering science in an understandable format but also can weave an incredible story around it. Were you always good story tellers?**

Miodownik:

I grew up as one of four sons to immigrant parents. Hearing the stories of how my parents came to live in London was always part of the background to my childhood. I wasn't much of a story teller myself though, I had much louder and funnier brothers who did that. It was later in life when I became a materials scientist that I recognised that I had to learn to be a better story teller if I was going to be a good teacher. We learn through stories, they help us remember what is important whether it's the number of protons in a carbon atom, or that stiffness is different from strength. Finding the right stories that hook the interest of my students makes the calculations and computations I require of them become meaningful - not something just to learn for an exam, but to understand the world around them. Telling stories is like any craft, the more you practise the better you get.

Ramirez:

I never really thought of myself as a storyteller. I actually see myself as that exuberant little girl from so long ago who loves science and who just wanted to share it with those around me.

When I was growing up, I really enjoyed my science lessons in my grammar school and loved sharing them with my family, particularly my grandmother. My grandmother was always interested in what I learned. When I spoke with her, I always wanted to make her feel included even though my science lessons might not have been familiar to her. To do so, I would describe science concepts by comparing them to everyday things in life. Sometimes I would anthropomorphize my lessons and turn them into a story. It was those skills of conveying information that I honed long ago that I now apply to my work today as a science communicator. When writing *The Alchemy of Us*, I shared my excitement for the topic of materials science and made sure that the concepts were understandable to readers often by using analogies and by telling stories. I did this so that readers entering this unknown world of science would feel included, too.

*Continued on page 5*

**Q: An example - You have very different styles but, as I noted, you are both amazing story tellers. I would like for our readers to get a small example of what I mean. Would you be willing to share with us a small excerpt from one of your books that shows an example of this?**

Ramirez:

When writing for the general public, I've learned that the main job of a sentence is to make the reader want to read the next sentence. We live in a world where many things are vying for our attention, so it is important to pull in the reader and hook them. It was with this mindset that I wrote my first paragraph of my book *The Alchemy of Us*:

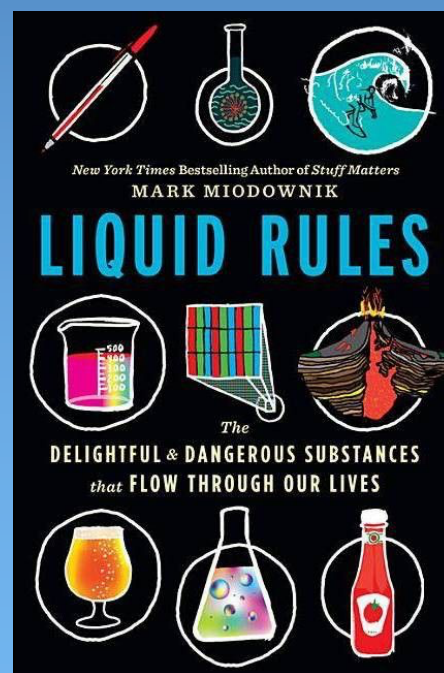
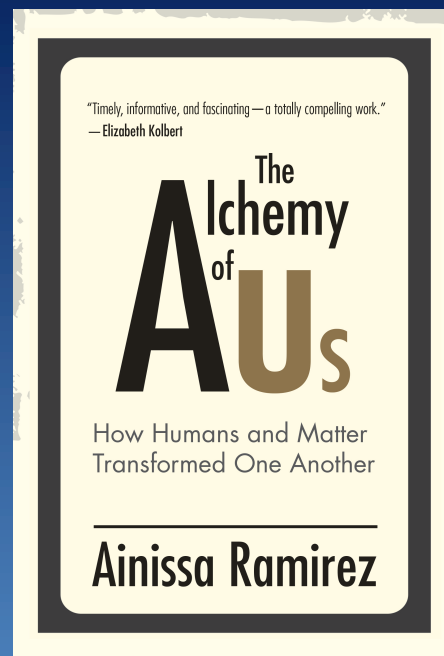
Like clockwork, a recognizable knock came at the door. It was a Monday in the fall of 1908 and just like every Monday, a woman named Ruth Belville stood at the entryway of a London watchmaker. She wore a dark dress cinched with a broad waistband that offered a hint there was a slim shape underneath the thick fabric. Her ankle-length hem cast a wide shadow that obscured her shoes from sight. Her hair was gathered up neatly under her hat and on her arm hung a modest yet oversized handbag. There at the entrance, aware of the time, she eagerly waited. When the door finally opened, the storekeeper greeted the weekly visitor with "Good morning, Miss Belville. How is Arnold today?" She replied, "Good morning! Arnold is four seconds fast." She then reached into her handbag, grabbed a pocket watch, and passed it to the watchmaker. He used it to check the store's main clock and then returned the pocket watch to her. She left. Their transaction was now complete. Ruth Belville was in the unusual business of selling time with her watch named Arnold.

I loved the story of Ruth Belville because she is such a fascinating woman who had a career of supplying time to businesses. But from the point of view of the book's architecture, she is also a useful device. I use her story in a number of ways: She serves as the thread between different topics pertaining to clocks. She also serves as proof of how society had a growing obsession with timekeeping. I could have easily written a declarative sentence stating that fact. But it is far more compelling to the reader to see this unfold with Ruth Belville. The story of her business of selling time sticks in a reader's mind better than just hearing facts about it.

Miodownik:

The opening paragraph from my book *Stuff Matters*:

As I stood on a train bleeding from, what would later be classified as a thirteen centimetre stab wound, I wondered what to do. It was May 1985, and I had just jumped onto a London Tube train as the door closed, shutting out my attacker, but not before he had slashed my back. The wound stung like a very bad paper cut and I had no idea how serious it was, but being a British schoolboy at the time, embarrassment overcame any sort of common sense. So instead of getting help, I decided the best thing would be to sit down and go home, and so bizarrely, that is what I did.



Continued on page 6

**Q: How important do you think story telling is in doing outreach? Do you have suggestions for those who wish to improve their story telling abilities?**

Miodownik:

People love stories and once you have them hooked on a narrative and set of characters they will want to know more. Telling stories allows you to tell them things that they might otherwise have had no interest in, such as that carbon has six protons in its nucleus or that stiffness is not strength. Reading or listening to other people's stories is helpful, but in general the only way to get better at telling stories is to try, fail, and have the perseverance and desire to try again.

Ramirez:

Telling great science stories is vital. Not all students easily take in information in the form of graphs and formulas. In fact, a very small population resonates with such ways of presenting information. Yet, all people can take in a story. There is even research that says our brains are hardwired for them.

Stories are stickier than facts. Stories are also a useful vehicle. With them, you can couch science principles and concepts, whereby the story acts like a conveyor belt, moving the reader along. But in order to do so, scientists have to adopt a new habit of giving the reader just enough information to feel included. For stories to work, we don't have the luxury of sharing all the scientific details we want to share.

Stories also require that we take a new posture when connecting with the public. Outreach means meeting readers where they are, and one way to make this connection is to employ popular culture. When writing *The Alchemy of Us*, I wanted to explain Einstein's special theory of relativity, particularly the concept of time dilation. It was clear to me that a layperson might not get it. So what I did is use music to explain how time expands. I found research that said that our brains keep track of time with physical cues, such as the position of notes on a musical score. However, in jazz, musicians don't play notes exactly the same, but oftentimes earlier or later than what is written on a page. As a result, our brains lose a sense of time, stretching and contracting with these notes. This might be a bit of a stretch, but audiences can relate to jazz more than Einstein, and after they do so, they are willing to take the next step to think about the special theory of relativity. In this case, I meet people where they are, and then take them to where I want them to eventually be. We need more of that in science outreach and we can do that with relatable science stories.

**Q: What keeps you going in doing outreach? Or what are the personal rewards of doing outreach that motivates you to continue?**

Ramirez:

I am convinced that improving science literacy is one of the most important things the world needs right now. So, it is that fact that keeps me motivated. We live in a world where people doubt science—and scientists. I believe if people had more science in their lives, they can develop what Carl Sagan called a “bologna tester.” They need to be empowered to be able to sniff out facts from fiction. In this world of fake news, the world needs this skill more than ever.

As for my personal rewards, well, there is nothing more satisfying than doing the work that you believe you were designed to do. There is nothing like having your brain “on fire” with ideas and having access to the tools to make them come to life. What also satisfies me is when I occasionally hear from readers, when they report that they found what I wrote to be interesting. I so enjoy hearing that. When I was a professor, I loved witnessing the moment when a student “got” something I taught. I still relish that moment, and hope to create similar occasions with what I write. Doing so makes me feel that I will have a little part in shaping the future.

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Miodownik:

I enjoy outreach, that's the first reason I do it. I think it is important for the public to realise that science is not done by a whole load of geniuses, it is done by collections of people all working together, some like me are not amazingly smart, but what we do together is smart and does change the world. So I just let them to know I am an ordinary person working on an extraordinary project called materials science.

I think outreach is vital to attract a diverse range of people both in terms of gender and ethnicity to take up science. This is important because science should be done for the people by the people. Even though I am part of the privileged group of white males who get to feel at home in science, I hope to help change the system that prevents others thriving in science. Outreach allows me to speak out, it gives me a voice.

Doing outreach also makes me a better teacher because I get better at communicating. It also makes me a better researcher because the public often have wisdom and expertise which informs the kind of materials science I do. For instance, I now work on plastic waste because I gave a talk about materials science at a school. When it came to questions the kids asked me whether I was working on solving the problem of plastic waste polluting the oceans and the soil. I replied that I wasn't working on this problem, and they asked me what else could be more important than helping to solve this environmental catastrophe. I had to agree with them and started applying for grants.

### **Q: Any advice for our readers on doing outreach?**

Miodownik:

Don't do it unless you are passionate about your science. If you are passionate, express that passion.

Ramirez:

Do that little thing you can do in your wheelhouse to move the science literacy needle positively. Not all of us have the same skill, so we must not expect each other to do the same thing and at the same level. If you can do a Youtube video, great. If you can write an Op-Ed, great. If you can visit a classroom, great. If you can team up with a science museum, great. If you can give advice on science policy, great. If you can start a podcast, or be on social media, or make appearances on television, great, great, great. Do what you can and do what you can do well. We don't need bad and boring science content out there. So find what you excel at and then do that. We need all scientists of all stripes and ages and experiences on deck. So find what it is that you do well and then make sure to do it.



Mark Miodownik

<http://www.markmiodownik.net>



Ainissa Ramirez

<https://www.ainissaramirez.com>

## Dwight Nicholson Medal for Outreach

The Forum on Outreach and Engaging the Public assumes responsibility for this prize. This important APS prize consists of the Nicholson Medal and a certificate that includes the citation for which the recipient has been recognized. The Medal is sponsored by the friends of Dwight Nicholson, and through a generous gift from Professor Herb Berk, the Medal will be awarded with a stipend of \$2,000. Up to \$1,500 will be available for the recipient's travel expenses to the meeting at which the Medal is presented.

The prize shall be awarded to a physicist who either through public lectures and public media, teaching, research, or science related activities has

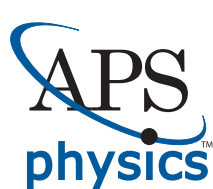
1. successfully stimulated the interest and involvement of the general public on the progress in physics, or
2. created special opportunities that inspire the scientific development of students or junior colleagues, or has developed programs for students at any level that facilitated positive career choices in physics, or
3. demonstrated a particularly giving and caring relationship as a mentor to students or colleagues, or has succeeded in motivating interest in physics through inspiring educational works.

Full details are at: <http://www.aps.org/programs/honors/awards/nicholson.cfm>

Nomination deadline is usually the first business day in June.

*Contributed by: E. Dan Dahlberg*

*Know someone who would be deserving of the Nicholson award or worthy of being an APS Fellow? Don't wait!!! Start the nomination process now.*



*Dwight  
Nicholson  
Medal for  
Outreach*





## FOEP Nominations for APS Fellows



### What

APS Fellowship constitutes recognition by one's professional peers of exceptional contributions to the physics enterprise. Only a small fraction of the APS members reach the level of fellows and therefore this is an important recognition.

### Who

All APS members can be nominated for fellowship through FOEP. The deadline for Fellowship nominations is usually in May. We strive to have a diverse group of nominees and encourage the nomination of members of all underrepresented groups.

### How

Nomination is done entirely on-line. Complete instructions for the nomination are available at: <http://www.aps.org/programs/honors/fellowships/nominations.cfm>.

The process consists of: providing the nominee's contact and professional information,

uploading nomination letters documenting the accomplishments of the nominee and explain why he or she is deserving of recognition. Note that it is the responsibility of the nominators to provide a compact however complete nomination.

### Evaluation

Nominations are evaluated by the FOEP nomination committee, reviewed by the full APS Fellowship Committee, and finally submitted for approval to the APS Council.

### Subject

Outreach is a broad enterprise, spanning academia, industry and national laboratories, as well as freelance professionals such as writers, journalists and bloggers. Outreach activities are often overlooked and undervalued. Thus it is important to think about and propose people who have an exceptional track record in this area.

### Why

Nominating someone for APS fellowship takes time; however, it is a great way to emphasize the importance of reaching out to and engaging with the public. At the personal level it is very satisfactory to get recognition of your peers.

*Contributed by: Ivan K Schuller*

Who

APJ

## FOEP at the Virtual March and April Meetings 2020

The physics community as a whole is very lucky to have many gems still shared from APS's quick turn around of creating a virtual depository for the March meeting. If you have not seen their virtual website, you should! The virtual March meeting site is at: <https://virtualmarchmeeting.com/>. The Virtual April Meeting has some wonderful presentations and posters as well: <https://april.aps.org/about/virtual/>.

Although FOEPs sessions were cancelled for both meetings, we hope to have many of our speakers appear in 2021. One thing that went very well was submissions for FOEPs Thing Explain.

### Thing Explain Your Research

Sponsored by the APS Forum on Outreach and Engaging the Public  
Thanks to James Kakalios, Jon Schuller, Rebecca Thompson

#### PHYSICS – MADE SIMPLE.... TOO SIMPLE!

Physicists routinely employ technical language when discussing their research, but often this terminology is a barrier when communicating our results with the general public. The Forum on Outreach and Engaging the Public of the APS has challenged physicists to explain their work in simple words. **VERY** simple words. They were asked to translate their research titles using **ONLY** the one thousand most commonly used words in the English language.

Inspired by Randall Munroe's book "Thing Explainer: Complicated Stuff in Simple Words," physicists were asked to translate the title of one of their talks at the March meeting (contributed or invited), but they could **ONLY** use the 1000 most common words in English, as found at <https://splasho.com/upgoer5/> !

(Warning: this list does NOT include the words: Topological, Insulator, or Graphene.)  
We received **MANY** great submissions, and a panel selected a Baker's Dozen of Thing Explained titles for a contest

Each Thing Explain title would be paired with the actual title of the researcher's talk, along with two other titles from the same session at the APS March Meeting  
A panel of Awesome Judges: John Anderson, Dennis Overbye, Diandra Leslie-Pelecy, Michael Rudolph and Ainissa Ramirez, would then guess which actual title corresponded to the Thing Explained title.

Contestants would win fabulous prizes, and illustrate the challenges of science communication  
We were all set for a public event Wednesday evening, March 5 at the APS meeting, and then.....

The March Meeting was cancelled over concerns regarding the COVID-19 coronavirus.  
But we had these great submissions – and we are all set for a contest.  
So, instead of a panel of judges, why not have **YOU** be the judge?

What follows is some of what we would have used at the **THING EXPLAIN YOUR RESEARCH** event. Only now, you have to guess which is the correct title.

## Physics - Made Simple...Too Simple!!

Keep track of your score, and see how you rank as a “Science Translator”

A few of the Thing Explained title submissions are on the left and the actual titles are somewhere on the right. Match the real title to the submission and see how you did. (Answers and scoring are on page:13)

### Ready, Fearless Reader? Let's Get to Work!

1. <i>Using really small guns to find out how heavy a thing is by looking at just one bit of the thing at a time</i>	a. Interrogating Entangled Matter with Entangled Probes
2. <i>Studying a Thing with Uses in Tomorrow's Computers by Hitting it with Other Stuff</i>	b. Interrogating collagen mechanics at the single-molecule level
3. <i>The getting wider and drying of drops sitting on a table</i>	c. Characterizing the Superconducting State of $\text{CuxBi}_2\text{Se}_3$ Through Muon-Spin Relaxation/Rotation
4. <i>Hot stuff carried by bits of sound shakes around when it goes through some stuff that can pick up other like stuff</i>	d. Periodically strained graphene lattice: flat bands
5. <i>Explaining Different Stuff with the Same Thing</i>	e. A doping-dependent switch from one- to two-component electron-hole superfluidity with high transition temperatures in coupled TMD monolayers
6. <i>See small things that move! They will do the work for us, If we can find them.</i>	f. Engineering Low-Disorder Superlattice Potentials in Graphene-Based Van der Waals
7. <i>Pulling over and over "the thing we love the most" makes its life-lines straight</i>	g. Relating Electrical Properties of Highly Disordered Insulating Materials via the Dispersion
8. <i>Looking at and pulling on the body's building blocks, one at a time</i>	h. Magneto-oscillations in the Thermal Conductivity of Kitaev Magnet $\text{RuCl}_3$
9. <i>Lock the ball with full of cool way; Fa la la la la la, la la la. Flip the bit with brush of shock in; Fa la la la la la, la la la.</i>	i. Single-Molecule Sensitivity in Mass Spectrometry Using Nanoscale Ion Sources
10. <i>Some places are better than others. If there are too many couples, they can dance in two rooms instead of one and things can become hot</i>	j. Intruder dynamics in a 2D granular system: Effects of dynamic and static basal friction
11. <i>Why do balls get stuck when you try to push them through a box of rocks?</i>	k. Electric field manipulation of the molecular spin state of a Fe(II) spin crossover complex
12. <i>Looking at things which are locked together in a confusing way using other things which are locked together in a confusing way</i>	l. Capturing In Operando Electronic Structure of Microscopic 2D Materials
13. <i>How to make the very, very tiny bits in the stuff-we-study ride clean waves, that repeat over and over again, and look exactly how we want them to look by putting the stuff-we-study between other things like it while keeping every layer completely straight</i>	m. Spreading and evaporation of sessile droplets

## Outreach Research

What physics outreach programs are located near me? How do my efforts compliment others' physics public engagement? How can I talk to my department chair or administrators about supporting informal physics events? If you have wondered about any of these questions, then we invite you to join our research project!

We are a group of informal physics education researchers at Michigan State University (PERL@MSU). We are working on an NSF-funded project (AISL #1713060) and are actively looking to catalogue **all informal physics programs or events located in the United States** (or in other countries!). Data from this project will be used to advocate for more and better physics public engagement. We would love to hear your story, especially how your program is affected in these unprecedented times. Outcomes from this project will include reports for the whole physics community and an interactive map showing event/program locations and information - by participating you can **put your public engagement effort on the map!**

If you lead an informal physics program or physics outreach event, we would deeply appreciate your participation in this research project by filling out a **10-15 minute [survey](#) about your program!** You may also choose to participate in a follow-up interview.

Link to survey:

[Survey for leaders of Informal Physics Programs and Events](#)



QR code for the survey:

Or paste this into your browser: [https://survey.az1.qualtrics.com/jfe/form/SV\\_et8iDORVCe1IrY1](https://survey.az1.qualtrics.com/jfe/form/SV_et8iDORVCe1IrY1)

Should you need any further information, please do not hesitate to **contact us (Dr. Dena Izadi at [izadiden@msu.edu](mailto:izadiden@msu.edu) or Dr. Katie Hinko at [hinko@msu.edu](mailto:hinko@msu.edu)).**

**Thing Explain Answers:**

1. <i>Using really small guns to find out how heavy a thing is by looking at just one bit of the thing at a time</i>	i. Single-Molecule Sensitivity in Mass Spectrometry Using Nanoscale Ion Sources See: <a href="http://meetings.aps.org/Meeting/MAR20/Session/S20.3">http://meetings.aps.org/Meeting/MAR20/Session/S20.3</a>
2. <i>Studying a Thing with Uses in Tomorrow's Computers by Hitting it with Other Stuff</i>	c. Characterizing the Superconducting State of $Cu_xBi_2Se_3$ Through Muon-Spin Relaxation/Rotation See: <a href="http://meetings.aps.org/Meeting/MAR20/Session/U60.4">http://meetings.aps.org/Meeting/MAR20/Session/U60.4</a>
3. <i>The getting wider and drying of drops sitting on a table</i>	m. Spreading and evaporation of sessile droplets See: <a href="http://meetings.aps.org/Meeting/MAR20/Session/M15.9">http://meetings.aps.org/Meeting/MAR20/Session/M15.9</a>
4. <i>Hot stuff carried by bits of sound shakes around when it goes through some stuff that can pick up other like stuff</i>	h. Magneto-oscillations in the Thermal Conductivity of Kitaev Magnet $RuCl_3$ See: <a href="http://meetings.aps.org/Meeting/MAR20/Session/L47.2">http://meetings.aps.org/Meeting/MAR20/Session/L47.2</a>
5. <i>Explaining Different Stuff with the Same Thing</i>	g. Relating Electrical Properties of Highly Disordered Insulating Materials via the Dispersion See: <a href="http://meetings.aps.org/Meeting/MAR20/Session/W34.2">http://meetings.aps.org/Meeting/MAR20/Session/W34.2</a>
6. <i>See small things that move! They will do the work for us, If we can find them.</i>	l. Capturing In Operando Electronic Structure of Microscopic 2D Materials See: <a href="http://meetings.aps.org/Meeting/MAR20/Session/D36.4">http://meetings.aps.org/Meeting/MAR20/Session/D36.4</a>
7. <i>Pulling over and over "the thing we love the most" makes its life-lines straight</i>	d. Periodically strained graphene lattice: flat bands See: <a href="http://meetings.aps.org/Meeting/MAR20/Session/D51.4">http://meetings.aps.org/Meeting/MAR20/Session/D51.4</a>
8. <i>Looking at and pulling on the body's building blocks, one at a time</i>	b. Interrogating collagen mechanics at the single-molecule level See: <a href="http://meetings.aps.org/Meeting/MAR20/Session/L26.3">http://meetings.aps.org/Meeting/MAR20/Session/L26.3</a>
9. <i>Lock the ball with full of cool way; Fa la la la la la, la la la. Flip the bit with brush of shock in; Fa la la la la la, la la la.</i>	k. Electric field manipulation of the molecular spin state of a Fe(II) spin crossover complex See: <a href="http://meetings.aps.org/Meeting/MAR20/Session/G52.3">http://meetings.aps.org/Meeting/MAR20/Session/G52.3</a>
10. <i>Some places are better than others. If there are too many couples, they can dance in two rooms instead of one and things can become hot</i>	e. A doping-dependent switch from one- to two-component electron-hole superfluidity with high transition temperatures in coupled TMD monolayers See: <a href="http://meetings.aps.org/Meeting/MAR20/Session/U62.8">http://meetings.aps.org/Meeting/MAR20/Session/U62.8</a>
11. <i>Why do balls get stuck when you try to push them through a box of rocks?</i>	j. Intruder dynamics in a 2D granular system: Effects of dynamic and static basal friction See: <a href="http://meetings.aps.org/Meeting/MAR20/Session/M24.8">http://meetings.aps.org/Meeting/MAR20/Session/M24.8</a>
12. <i>Looking at things which are locked together in a confusing way using other things which are locked together in a confusing way</i>	a. Interrogating Entangled Matter with Entangled Probes See: <a href="http://meetings.aps.org/Meeting/MAR20/Session/L37.4">http://meetings.aps.org/Meeting/MAR20/Session/L37.4</a>
13. <i>How to make the very, very tiny bits in the stuff-we-study ride clean waves, that repeat over and over again, and look exactly how we want them to look by putting the stuff-we-study between other things like it while keeping every layer completely straight</i>	f. Engineering Low-Disorder Superlattice Potentials in Graphene-Based Van der Waals See: <a href="http://meetings.aps.org/Meeting/MAR20/Session/A51.7">http://meetings.aps.org/Meeting/MAR20/Session/A51.7</a>

So, How'd You Do?

- Score 13 – 10: Science Translator Extraordinaire!
- Score 9 – 6: Science Translator Ordinaire!
- Score 5 – 3: Science Translator Pretty Fair!
- Score 2 – 0: Science Translator Hit a Snare!

## Outreach Info & Resources

info

### APS Physics Central has an “Outreach Guide!”

The guide provides ideas, opportunities, and information on how to conduct various types of outreach.

Check it out! <https://www.aps.org/programs/outreach/guide/>

And within this guide you’ll find information about:

#### Outreach Ideas

- [Physics on the Road](#)
- [Public Lectures - One Time](#)
- [Public Lectures - Series](#)
- [Open Houses](#)
- [Science Cafes](#)
- [Demo Shows \(on campus\)](#)
- [Working with a Museum](#)

#### Outreach Tips

- [Public Relations](#)
- [Working with Children and Schools](#)

#### [Demos List](#), [Experts](#)

### The Institute of Physics has a website devoted to Public Engagement:

<http://www.iop.org/activity/outreach/index.html>

This website provides ideas for outreach activities, how to run an event, evaluation of an event or activity, as well as sign ups for events (in the UK).

### Find out about IOP’s 3 minute wonder challenge:

[http://www.iop.org/activity/3-minute-wonder/page\\_60438.html](http://www.iop.org/activity/3-minute-wonder/page_60438.html)

### The Alan Alda Center for Communicating Science

Has many resources, and classes you can sign up for at Stony Brook University. There is a “Workshops on the Road” program that visits other locations. Check out their website for ideas and information.

<http://www.centerforcommunicatingscience.org/alan-alda/>

## Questions and Ideas



### Want to get more involved?

Email someone on the executive committee. Contact info can be found on the last page of this newsletter or online at:

The Forum on Outreach and Engaging the Public at

<http://www.aps.org/units/foep/governance/officers/index.cfm>

### Newsworthy Items?

Have an idea for something to include in the Newsletter: An outreach activity, an idea for an article, best practices, what does and doesn't work, or something else? Please send your ideas to the newsletter editor at

[FOEPAPSnewsletter@gmail.com](mailto:FOEPAPSnewsletter@gmail.com)

## Web Sites that Engage and Inform the Public

info

Vihart

<https://www.youtube.com/watch?v=WkmPDOq2WfA>

The Particle Adventure

<https://particleadventure.org/>

Mathologer

[https://www.youtube.com/channel/UC1\\_uAIS3r8Vu6JjXWvastJg](https://www.youtube.com/channel/UC1_uAIS3r8Vu6JjXWvastJg)

FunSize Physics

<https://funsizephysics.com/>

SixtySymbols

<https://www.youtube.com/user/sixtysymbols>

Brainiac75

<https://www.youtube.com/user/brainiac75>

When Things Get Small

<https://www.youtube.com/watch?v=Zuj5LWzb0uI>

APS Physics Central

<https://www.physicscentral.com>

OSA's Optics4kids

<https://www.optics4kids.org/home>

IOP Physis

<https://www.iop.org>

NASA STEM Engagement

<https://www.nasa.gov/stem>

Expanding Your Horizons Network

<https://www.eyhn.org/aboutmain>

International Particle Physics Outreach Group

<https://www.ippog-test.web.cern.ch>



## Let FOEP Post Your Outreach Links

Do you have a favorite web site, web article, and or video you like, or perhaps your own outreach website? Send it to us for consideration of inclusion on this page so everyone can enjoy it. Send ideas to: [FOEPAPSnewsletter@gmail.com](mailto:FOEPAPSnewsletter@gmail.com)

## Funding Information

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### **APS grants for public outreach and informing the public**

APS annually awards several grants up to \$10,000 to help APS members develop new physics outreach activities. Programs can be for traditional K-12 audiences or projects for engaging the public and informing them about the importance of physics in their daily lives.

<https://www.aps.org/programs/outreach/grants/>

**Marsh W. White Awards** are made to Society of Physics Students Chapters “to support projects designed to promote interest in physics among students and the general public.”

<https://www.spsnational.org/awards/marsh-white>

### **SPIE education outreach grants for photonics and optics**

As part of its education outreach mission, SPIE provides support for optics and photonics related education outreach projects.

<https://spie.org/education/education-outreach-resources/education-outreach-grants>

### **AAPT – American Association of Physics Teachers, Bauder Fund Grants for Physics Outreach Programs**

Can provide funds to support special activities in the area of physics teaching.

<https://www.aapt.org/Programs/grants/bauderfund.cfm>

### **Alfred P. Sloan Foundation**

The Alfred P. Sloan Foundation offers grants toward promoting science and science understanding to the general public.

<https://sloan.org/grants/apply>

### **IOP Institute of Physics**

Public engagement grants open to all but only for projects taking place within the UK and Ireland

[https://www.iop.org/about/grants/outreach/page\\_38843.html](https://www.iop.org/about/grants/outreach/page_38843.html)

### **EPS European Physical Society**

Two grants that can fall into the outreach category are the EPS grant for Regional Physical Society Meetings that include items outside their usual grant categories, and EPS Award for Pre-University International Physics Competitions

[https://www.eps.org/?page=support\\_grants](https://www.eps.org/?page=support_grants)

Many institutions have their own internal outreach funding programs.



**FOEP**

**FORUM ON OUTREACH &  
ENGAGING THE PUBLIC**



# PHYSICS OUTREACH & ENGAGEMENT

## Executive Committee

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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](mailto:membership@aps.org) with your request to add FOEP to your membership, or send a letter requesting membership to APS membership department. 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.

*Physics Outreach & Engagement is a non-peer-reviewed newsletter of the Forum on Outreach and Engaging the Public, a forum of the American Physical Society. It provides information and news related to the Forum and provides a medium for Forum members to exchange ideas. Opinions expressed are those of the authors alone and do not necessarily reflect the views of the APS or of the Forum. If you would like to submit an article, commentary, letter, review, or contact us about another issue, please email the editor, [FOEPAPSnewsletter@gmail.com](mailto:FOEPAPSnewsletter@gmail.com)*

The Forum on Outreach and Engaging the Public can be found on the web at <http://www.aps.org/units/foep/index.cfm>