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## **NEWSLETTER**

**July  
2022**



*The Free IOP Communicators Conference is to be held on the 17<sup>th</sup> of November 2022*

## Upcoming IOP Communicators/Outreach Events

An unfortunate delay has postponed the leadership online event however there is still the member driven Communicators Conference to look forward to in November.

### **IOP Communicators Conference – (17<sup>th</sup> November)**

An opportunity for physics communicators and outreach enthusiasts of all levels to meet and discuss best practice and collaboration. With the theme 'Reaching Out, Catching Up' the conference focuses on examining how we've all had to adapt to the Covid19 pandemic, what lessons we can learn from that and how we can get back to engaging with the public, especially for underserved communities hit especially hard.

This is a totally free conference aimed at giving group members and the communication curious a chance to share their experiences and learn from others. The event will be in person at the London IOP HQ with opportunities for speakers, workshops and exhibition tables. As much of the event as possible will also be shared online for those not able to attend in person.

Whilst registration is not yet fully open you can express your interest as both an attendee or speaker at the event website [here](#) so that you're the first to hear when things go live. As this is a member focused event we want to work with people to be able to share as much and as interesting work as possible so do get in touch with [james.lees@physics.org](mailto:james.lees@physics.org) for any ideas you don't think fit into the registration form.

### **Leadership Online Event - (Delayed)**

This is a half-day online event focuses on developing key leadership skills among physicists including communication. Looking at clear areas which can be used as support for all members in their careers and leadership development.

Unfortunately, this event was delayed and did not take place. Further details will follow.

## Report on Past Events

### An IOP deliberation on measurement standards and inclusivity 2022

Have you ever thought about why measuring standards are useful? We have units of measure that are convenient (the tea spoon, a pint, the cm) fundamental constants (the speed of light, Planck's constant and many others) and measurement standards that are now called SI units. Would we have been able to make the discoveries in physics without this process of standardization? Have these units of measure been fairly attributed to the discovery teams and how do differing cultures see this? Are we missing anything? Four IOP special interest groups and the National Physical Laboratory held an open IOP deliberation: [The Culture of and naming of SI Units](#) on this topic on the 25<sup>th</sup> April 2022. This was a blended meeting with in-person at the IOP Kings Cross, London and an active online participation.



Over our one-day event, we had contributed talks and thought provocations from our contributors (specific details on our contributors is given below). From the National Physical Laboratory Stephen Giblin and Andrew Hanson shared the state-of-the art on how and why the SI unit system is important. We discussed

subtleties of how our visual perception is sometimes different to actual measurement. The History of Physics group collectively shared cameo and pen portraits of the named inventors (Volt, Watt, Becquerel, Faraday, Coulomb to name but a few). This included explaining moments from these scientists' lives where they gained insight from friends, family that –we believe – inspired the knowledge inventions that led to the unit standards. Dawn Watson from the Women in Physics Group discussed in this forum how the use of standards is useful, especially in her work practice in the nuclear industry. She also expanded on the wider need to make STEM and physics careers more inclusive. There is, she noted, the need for our professional practice to reflect wider role models and team based thinking to enable this. During our morning conversation, it was interesting to note how deeper universal physics concepts have become important in how standards have become developed, such as using the universality properties of the Quantum Hall effect. Also in the 1800's industrial development of steam power essentially used the water PVT phase-diagram property. Water has a large latent heat aspect, from which no doubt helped to derive the thermodynamic process concepts. The measurement of radioactive decay (the becquerel (Bq): the number of decays per second, or activity, from a sample of radioactive nuclei is measured) also marks a distinct use of random process properties as a signature of a measurable physical process.

The adoption of such probabilistic interpretations in physics was developed further in our afternoon conversations. Jean Boulton (from the Nonlinear and Complexity Physics Group) shared an approach articulated in her book 'Embracing Complexity'. Her ideas are informed by Prigogine's work in nonequilibrium thermodynamics and how he related that to evolution. Jean explained how complexity theory, with its focus on path dependency, particularity and indeterminism, implies when thinking about universal concepts such as standards. We discussed together that by standing back and exploring other (than Western European traditions) philosophical traditions, such as 5thC BC Daoist thinking we can re-envise the distinctions that are reflected in the terms determinism and indeterminism. Jean emphasised that the West's focus on timeless eternal laws, motivated in the seventeenth century by the desire to bring Man closer to God's eternal perspective, might blind us to the importance of fluctuations, context and history in how the universe finds its particularity of form and structure, a point emphasised by Prigogine and more recently by Smolin and Penrose. John Bruun, from the Physics Communicators Group, continued the deliberation with a perspective on where our national

practice of physics is currently. This included explain the IOP strategy focus on Limit Less (a campaign to enable more to practice physics) and university and industry standards around Equality, Diversity and Inclusivity. He also contributed an example from the 1800's how we can perceive the transformation from Newtonian to Lebinez calculus for mechanics though the lens of decolonising the topic.

We continued our conversation with two breakout groups: one on-line and one in-person. The adoption of stochastic and probabilistic properties for physics and setting standards is thought to be a key conceptual part of this. It enables the distinction and separation of purely random effects. The concept of probability is also very ancient Phoenician trading, gaming so the framing has been present for a long time. We discussed Chaos and forms of determinism such as the logistic map/attractor. Whilst this is more in a deterministic framing, interesting it does also represents ecosystem predator-prey systems and the idea that predators are more responsive to momentum than position (uncertainty principle) was pointed out. Perhaps there is a standard link (Feigenbaum constants, sub-harmonic resonance features, Eigen value-level repulsion) that can be further developed in the terms of standards and ecosystem type processes here. The EDI concept was recognised to be a contemporary filter that standards are going to need to be looked through, and this IOP deliberation is part of this. Widening our viewpoints to recognise diversity of thinking, allowing much more neurodiversity and disability participation was said to be important. We should also be careful of ageism creeping into young/early career narratives. We also discussed how the decolonising concept could present challenges, as the term almost indicates active political intent was part of the development of physics, as opposed to being engaged and an active part of the framing of the time. We agreed that it is important to remove culture bias from our experimentation and their analysis evaluations. This helps to avoid non-adoption of revised physical process values that challenge the prevailing, current norms. Double blind process are routinely used at NPL and IOP publishing and this is helping to mitigate such socially based evaluation biases.

Overall – an entertaining and thought provoking day. The transformations in our current society discussed in our deliberation it was thought will be helpful to our STEM culture. This helps make the access into physics more attractive to the early and practicing physics career community. Importantly – this deliberation – helps set a framing from where standards such as those set by SI units can be

viewed from the point of view of their intrinsic and universal properties. We concluded by remarking it will be interesting to think how a future society will view these standards in 50 and 100 years' time – what will stand the test of time?



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