A New Zealand professor and International Day of Light committee member explains why educational outreach is essential in light science.

What got you interested in outreach generally and in IDL in particular?
I guess from the outset, I’ve always been driven to participate in outreach. Since I moved to New Zealand, I think the opportunities presented themselves more clearly, partly because of the lab that I started, which is called the Photon Factory. The Photon Factory is a very outward-facing, multiuser laser facility. It has as part of its core mission the integration of science with society.

Outreach fits really well with the type of teaching I do. I teach a lot of those really big first-year classes in chemistry and physics, and the reason that I like doing that is because most of those people aren’t going to be scientists. It’s sort of the last chance that you get to help real people understand what science is about, and how it has an impact on their lives.

And you hope that, for example, the next Donald Trump is actually sitting in my class and can learn a little...
bit more before he has to make decisions about stuff. Everybody needs to know a bit about science and technology.

Q. How did the Photon Factory’s outreach efforts get started?
I guess our coordinated outreach activities really took off with the International Year of Light (IYL). As the co-chair of the New Zealand IYL National Committee, I wanted to make it extremely broad. The ethos of IYL was that light is important in all facets of our lives—whether it’s economic or artistic or scientific.

We had art competitions, we had a logo competition, and we engaged with the indigenous people here, the Māori community, to come up with a translation of “International Year of Light.” Then we held a tremendous number of outreach activities.

We got funding from the government under what’s called the Unlocking Curious Minds program. And that gave us funds to run activities at eight museums up and down the country. We developed “Light Matters” kits. And we would hand those out and the kids would play with them, and then they could take them home. We reached tens of thousands of people.

That was how we got started. It was those activities that took us to the next level. You go from being someone who knows science teachers who invite you to come and give talks, to knowing people who run museums, people in the government who are trying to stimulate an economy by growing high-tech knowledge, people in education who recognize that we don’t do enough in education with hands-on science and we need to change that.

Q. Can you talk about your activities with IDL 2019?
This year I’m participating as a speaker. I’ll be talking about how light is transforming the way we grow food—agriculture as in farming, but also animals. One of the things that we do in our lab is we have a spinoff company that sorts sperm by sex for the dairy industry using lasers. It’s about how you think about light, and how it can transform parts of your society that you don’t normally think about as being very high-tech. So, that’s one form of outreach.

We’re also linked with the Dodd-Walls Center for Photonics and Quantum Technology, a New Zealand Center of Research Excellence. The outreach that we’ve done with the center, just to give you an example—in 2018 we engaged over 13,000 people in over 82 events that ranged from public talks about gravitational waves to an IDL science fair.

We work with a lot of museums. And we also have a kind of science roadshow that we go on. Even out to some of the more remote islands. For example, this year we have developed a relationship with someone

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—Cather Simpson

Light Matters

During the International Year of Light, Simpson received a grant from the New Zealand government to produce low-cost take-home optics kits to inspire curiosity in young minds and promote hands-on involvement with light science. Each kit contained one of six light-related activities, ranging from fluorescent bacteria to edible optics, and the box itself acted as a spectroscope.

University of Auckland Ph.D. student Andy Wang coordinated the development and distribution of these Light Matters kits.

The light-inspired toy in each kit came with an individual code. Students could enter their code online, and they would see a light on a map representing where they were. A fun, visual activity for the students, this also helped Wang and Simpson to measure engagement. In 2015, 7,000 kits were distributed across New Zealand. As of January 2016, about 500 participants had registered their codes.

One of the experiments that Wang helped to design was a photometer activity. Wang has since upgraded this kit so that students in Auckland can measure chemical pollutants from organic waste in fresh and salt water, using a calorimeter to measure the color change. He recently received funding to distribute 200 water testing kits to Auckland schools.
who helps a particular Samoan community, and we sent some of these Light Matters kits out to this remote island so that the students there will have access to optics technology. Even a pinhole camera is an amazing thing, right? If you can understand that, you can understand a lot.

Q. Are many of your students involved in these outreach activities?

Absolutely. Virtually all of my students and postdocs have participated in this kind of outreach.

One of the most popular things we did was fluorescent face paint. At many of our events we had people painting themselves with fluorescent face paint. The students would talk to them about how things fluoresce. About how light is just a way to carry energy and information. So, those types of things my students found very rewarding. They got to see that kind of interpersonal interaction. Kids swamping them to come do the laser maze, or to come do the face paint, or to come play with the music boxes.

I think for some of my students, it’s been a real surprise that they like it so much. We don’t have any trouble at all getting volunteers!

Q. What do you think the future is for IDL? Why is it important to have an event like this?

The 21st century is going to be the century of photonics. I mean, it already is—over 100 components or processes in your cellphone are touched by light. My own view of the value of things like IYL and IDL is that we need to make sure that, first of all, the technology changes and the science that’s driving it gets adopted in the right way by civilization.

But also, I think having it come from an organization like UNESCO allows us to link IDL to issues of social justice and fairness. To link IDL, not just with people who study lasers for a living, but also with people who are keen on fixing the problem of light poverty in certain places in the world. With people who are using light for art. With people who understand that we need to be able to harness light more effectively.

And making sure that all of that happens equitably and fairly and with sustainability front and center.

I think IDL encourages people like us. At the Dodd-Walls Center and the Photon Factory, we’re doing quite a lot of outreach at the grassroots level. But it gives us a focus, a mission, and a way to be bigger than ourselves.