



Victoria Xu
2023 Winner, Theodor W. Hänsch
Prize in Quantum Optics
MIT Kavli Institute - LIGO
Laboratory, USA

was a huge honor, not just for me but for the entire Laser Interferometer Gravitational-Wave Observatory (LIGO) team. There are hundreds of us collaborating, with decades of theory and experimental proposals coming together to advance quantum science. It's a significant step forward to explore the limits of a quantum interferometer, which has increased the volume of the gravitational waves we can detect by 65% and reduced noise by upwards of 40%.

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I'm proud to be one piece of a puzzle that has enabled much in a brief time. In fact, we're starting to detect black holes about 10 to 11 billion years in the past. The universe is 13.8 billion years old, so we're beginning to see gravitational waves pushing into cosmic times. As we increase the sensitivity of our detectors, we will be probing earlier and earlier in the universe to places we can't see electromagnetically, and that's exciting; we are going to make fascinating discoveries unimaginable 20 years ago.

Pursuing long-term impact

Despite these milestones, when working on fundamental science, it can be challenging to see the daily impact. It's just been nine years since the start of gravitational wave astronomy, and where we are now in using lasers for precision measurements is like the difference between making the first lens and developing the James Webb space telescope. We've advanced technically at a rapid pace, yet sometimes, we need a reminder of just how far we've come. The Hänsch

Prize recognition has given a boost to all of us, to the project, reminding us that what we do matters and that our work will have long-standing outcomes.

I had that same encouragement when I attended Optica's Quantum 2.0 meeting to receive the prize. I met members of the prize selection committee and other conference leadership. In addition to feeling flattered our work was so widely acknowledged, I also made meaningful career connections. For

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As a new award in 2023, the Hänsch Prize spoke to me because it provided visibility for work that takes research in very complex technical directions—few prizes celebrate that level of fundamental exploration. The prize was even more attractive because Dr. Hänsch's work in laser-based precision measurements paved the way for the work I do today, which focuses on quantum measurement science.

Team effort

Needless to say, winning the prize



Victoria Xu, Paul Blackborow, Hamamatsu Photonics; Sterling Backus, Thorlabs Inc., and Ronald Holzwarth, Menlo Systems GmbH (left to right) at Optica Quantum 2.0 in 2023.

instance, Garrett Cole, technology manager at Thorlabs, invited me to do a seminar on our developments. Seeing others excited about these advancements and what they mean for science was pretty profound.

Future efforts

LIGO research is making an essential impact in quantum optics, but for a researcher, it's not always an easy decision to jump into a large-scale project. I firmly believe if you find something that interests you, you will also find collaborators and like-minded people who see the value in what you do and support your potential—no matter the project's

size. That's certainly true for me, and the Hänsch Prize not only helped to expand the project's visibility, but it also enabled me to demonstrate that there's a career in doing this type of

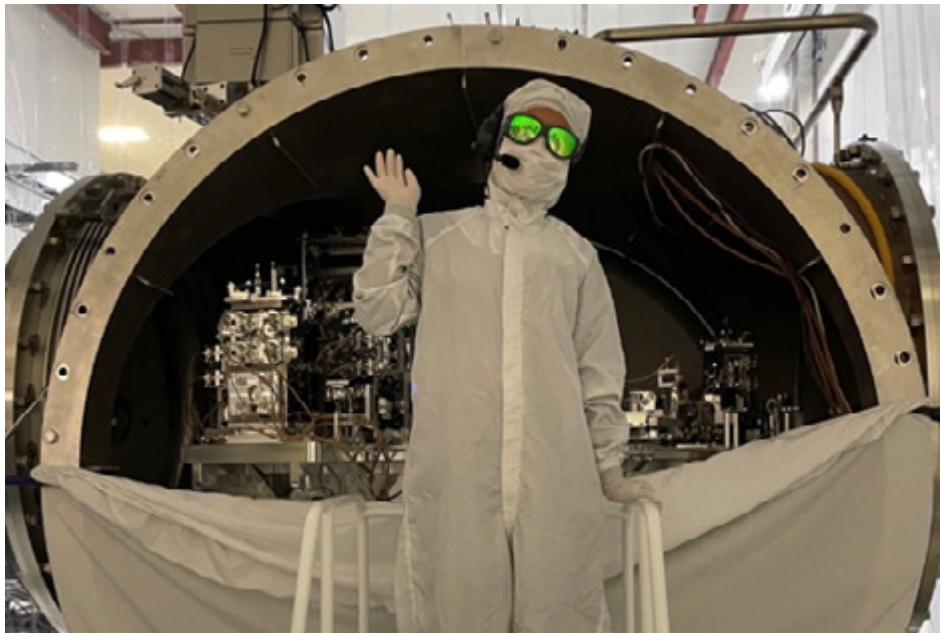
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work, one where individual success is celebrated.

Of course, engaging with the Optica Foundation helps as well. Through this prize, I've discovered a world of collaborators, mentors and quantum enthusiasts, not to mention an expanded awareness of my role in this ecosystem. None of this would be possible without the support

of the Hänsch Prize donors Menlo Systems, Thorlabs and Hamamatsu Photonics, and for that, I am deeply grateful.

The Hänsch Prize was launched in 2023. It is funded by a US\$250,000 contribution from Menlo Systems, Thorlabs and Hamamatsu Photonics to be offered for ten years. You can learn more at optica.org/HaenschPrize



Victoria at work.

