

electrochemical or mass spectroscopy processes.

PT: Did DARPA choose your technology?

PARANJAPE: After three years, they said they weren't going to implement it for their soldiers. The patch technology was ours to run with however we wanted. So, we thought, why don't we go after the diabetes market?

In 2013, we did a clinical trial. Our trial comprised 10 people with type 1 diabetes, and we applied the patch to their arms or forearms and did the test. Out of the 10, not one felt anything. It turned out that the detections of glucose by the patch tracked nicely with actual blood draws. The company sponsoring the clinical trial immediately licensed the technology.

The clinical trial was one of the most rewarding things I've ever done. I never thought in my wildest dreams I'd be involved in a clinical trial of my own device.

PT: What happened when you tried to bring the technology to market?

PARANJAPE: The company found that cracking the glucose market is very difficult. I'd be lying if I didn't say I wasn't disappointed. But I think the more disappointing part was that the major pharmaceutical players that we talked with bristled at the fact that the patch technology measures glucose in interstitial fluid and not blood. They contended that physicians only think about blood-glucose concentrations. Now almost every major continuous glucose monitor on the market takes measurements of glucose in interstitial fluid.

PT: What did you do next?

PARANJAPE: The company that licensed the technology is looking at other molecules to detect using the patch, like alcohol. And I am starting a

project right now looking at biomarkers for traumatic brain injury.

We're also looking at using the patch as a drug-delivery technology platform for treating diseases like Parkinson's. The patches that exist right now on the market, like the nicotine patch, must chemically modify a drug to be delivered through the topmost intact layer of skin. The drug must go through FDA [Food and Drug Administration] approval again. With our process, we're taking FDA-approved drugs and not modifying them.

I've also applied for a patent that uses my patch technology to simplify the diagnosis of cystic fibrosis. Collaborating with my wife, a cystic fibrosis physician at Johns Hopkins University, we are targeting the patch for use in countries like India and China and regions in Africa where cystic fibrosis is often misdiagnosed.

PT: What would you say to others considering commercializing their research?

Quantum sector jobs span specialties, degree requirements

Jobs in engineering, information technology, and research together make up nearly half of the roles in the global quantum workforce. Yet many quantum-related jobs in business development, arts and design, sales, community services, and other fields listed in the figure do not rely on STEM skills. (See also *PHYSICS TODAY*, April

2025, page 17.) The chart is adapted from one in a 2025 report by the Quantum Economic Development Consortium (QED-C), which provides research and market forecasts on the quantum economy.

Data reveal other qualities that employers in the quantum space are looking for in candidates. Last year, using

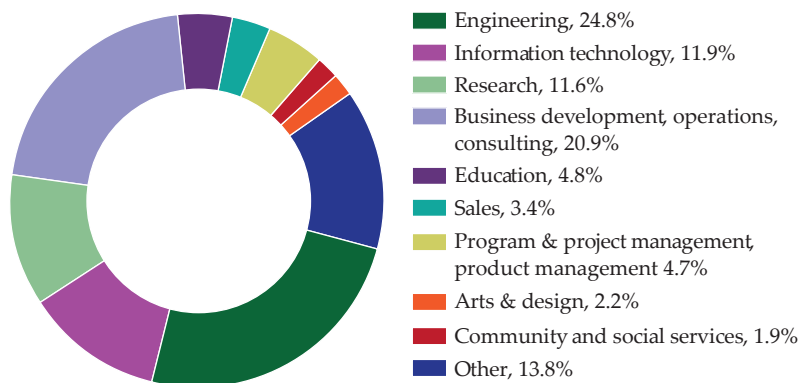
QED-C and Quantum Computing Report job postings from 2021 to 2023, the Chicago Quantum Exchange (CQE)—whose members include five universities and two national labs—did an analysis of more than 5000 roles in the quantum technology workforce. Among the ads posted in 2022 and 2023, about 31% requested that candidates have a PhD, and some 14% specified a master's degree. The remainder of the positions required a degree no more advanced than a bachelor's or no degree.

The authors of the CQE report found that the percentage of jobs requiring PhDs slipped from about 35% for 2021 to 29% for 2023, whereas the percentage asking for a bachelor's degree rose from about 35% to 38%. Ads for positions in the industry sector were less likely to require a PhD than were ads for roles in academia or government.

For more information on the quantum workforce, see the reports at <https://quantumconsortium.org/publications/stateofthequantumindustry2025/#2025report> and <https://chicagoquantum.org/degereports>.

Tonya Gary

Quantum workforce by role



(Figure adapted from Quantum Economic Development Consortium (QED-C), *State of the Global Quantum Industry*, 2025.)