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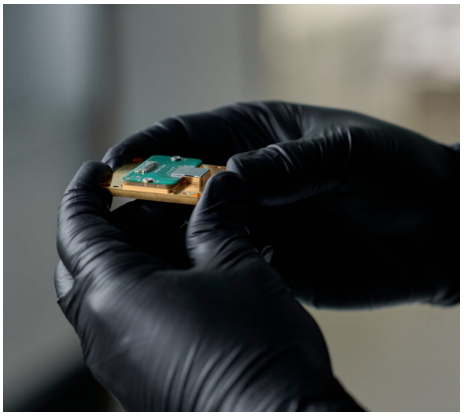
# Pixel Photonics pushes quantum forward with scalable light detection breakthrough

Quantum computing promises to be a gamechanger for almost every industry, from predicting weather more accurately and boosting cybersecurity, to speeding breakthroughs in research and artificial intelligence. While the timeline to bring practical quantum computing to market is still years away, those racing to make it a reality know that harnessing light as a carrier of information is critical to their progress.

To detect even the lowest signal strengths of light, high-sensitive detectors are essential. Superconducting nanowire single photon detectors (SNSPDs) are currently the light detector of choice for their high efficiency and speed. However, limitations like the need for cryogenic cooling—which makes SNSPDs expensive and bulky—plus challenges in scaling up to large array sizes and integrating them with other components, make them less than ideal for widespread use.

Since 2020, Pixel Photonics GmbH, based in Münster, Germany, has been working to solve these issues by developing a unique approach to single-photon detection. The company's waveguide-integrating superconducting nanowire single-photon detectors, or WI-SNSPDs, can detect single particles of light, known as photons, with exceptional speed and precision, while being directly integrated onto photonic chips. This enables the detectors to be manufactured at scale using industry-standard processes, making them both powerful and cost-effective.



Chip module developed by Pixel Photonics. (Photo provided by Pixel Photonics)

The breakthrough, based on eight years of research, was initially focused on quantum photonics. As interest in quantum technologies grew, the team recognized the need for a market-ready solution.

Nicolai Walter

"It quickly became clear that the potential of our platform extended far beyond quantum," said Nicolai Walter, Pixel Photonics' co-founder and CEO. "We saw how our detectors could unlock new possibilities for microscopy, medical diagnostics, and advanced communication—all fields where the highest performing light detectors could not yet be adopted."

## PROGRESSING TO SERVE MULTIPLE MARKETS

Hitting strategic milestones is key to this growth. Pixel's detectors are already being used in quantum computing technology to help solve complex problems beyond the reach of traditional computers, as well as in quantum communication to enable ultra-secure data transfer.

A major turning point for Pixel was securing its first funding round, led by HTGF and Quantonation. "The investment allowed us to significantly expand our team, scale our capabilities, and build strong partnerships with leading international players like QuiX Quantum and DLR," shared Walter.

Additional funding from SPRIND is helping advance the detectors into multimode detection, which is essential for markets like medical imaging and diagnostics.

Today, Pixel Photonics is the only provider of spectrally broadband, polarization-in-

sensitive SNSPDs that scale cost-effectively using commercial foundries. Their system-level products are turn-key, maintenance-light, and ready for integration by OEMs (Original Equipment Manufacturers).

Dena desktop and rack system. (Photo provided by Pixel Photonics)

## ENTERING THE U.S. MARKET WITH SUPPORT FROM LUMINATE

With initial customer engagement well underway, the Pixel team applied to Luminate NY to take the first steps in establishing a U.S. sales presence.

Each year, the Luminate accelerator selects 10 to 12 startups from around the world and brings them to the Finger Lakes region to tap into the vast optics, photonics, and imaging (OPI) resources that exist here. Companies receive an initial investment of $100,000 to start, along with the chance to compete for a portion of $2 million in follow-on funding, with a grand prize investment of $1 million going to Company of the Year. During the seven-month program, the teams also go through more than 200 hours of curriculum to complete the due diligence necessary for attracting investors and forging partnerships with contract manufacturers and channel partners that are willing to work with startups.

"Luminate gave us guidance on how to scale our niche research tool into a commercial-grade product, including packaging considerations," Walter explained. "Luminate made valuable introductions to investors, manufacturing resources, business development, and marketing partners, as well as to academic stakeholders and early-adopter customers. Using the feedback collected, we've refined our approach for the U.S. market."

If the company wins more funding at Luminate Finals, Pixel would expand its team locally, initiate pilot deployments with OEMs, and eventually scale production using U.S.-based supply chain and manufacturing partners.

## MAKING NEW POSSIBILITIES COME TRUE

The impact on the quantum industry could be significant, with the market estimated to reach $2 billion by 2032. To capitalize on this, the team is reaching "first adopters" within R&D labs, quantum hardware companies, and secure communication providers—those looking for cutting-edge light detection solutions, especially those who have not considered superconducting detectors. Their goal is to sign one to two OEM contracts in quantum or medical imaging in the near future.

"Our detectors will accelerate the commercial adoption of quantum computers," said Walter. "In turn, they'll enhance the security of our global communication infrastructure and bring the promise of new applications—such as advanced medical diagnostics that can improve the precision and accuracy of life-saving disease detection—to more healthcare settings across the world."

*The companies of Luminate cohort 8 will compete for $2 million in follow-on funding at Luminate Finals 2025 on October 22. The program is funded by Empire State Development's Finger Lakes Forward Upstate Revitalization Initiative. For more information about the Luminate accelerator and Finals 2025, visit luminate.org.*