

Scientist Combine the Quantum and Conventional Internets.

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Courtesy of SynEvol
Credit: Institute of Photonics

Four researchers from Leibniz University Hannover's Institute of Photonics have created a novel transmitter-receiver device for optical fiber transmission of entangled photons. This discovery may make it possible to route the quantum Internet—the next wave of telecommunications technology—via optical fibers.

The security of vital infrastructure will be guaranteed by the quantum Internet, which offers eavesdropping-proof encryption techniques that even future quantum computers will not be able to crack.

"We need to transmit entangled photons via fiber optic networks in order to realize the quantum Internet," says Prof. Dr. Michael Kues, who is the head of the Institute of Photonics and a board member of the PhoenixD Cluster of Excellence at Leibniz University Hannover. Additionally, we wish to keep sending normal data via optical fibers. Our work represents a significant advancement toward fusing the traditional and quantum internets.

Through their experiment, the researchers were able to show that photons can still remain entangled even when they are conveyed in tandem with a laser pulse. Dr. Philip Rübeling, a quantum Internet researcher at the Institute of Photonics, says, "We can change the color of a laser pulse with a high-speed electrical signal so that it matches the color of the entangled photons." "We can combine laser pulses with entangled photons of the same color in an optical fiber and separate them again thanks to this effect."

This might facilitate the integration of the quantum and ordinary Internets. Utilizing both transmission techniques for each color in an optical cable has not been feasible up until this point. A doctorate student in Kues' group named Jan Heine claims that "the entangled photons block a data channel in the optical fiber, preventing its use for conventional data transmission."

The photons can now be conveyed in the same color channel as the laser light because the experiment has shown the notion for the first time. This suggests that conventional data transfer might still make use of all color channels. Prof. Michael Kues states, "Our experiment demonstrates how the practical implementation of hybrid networks can succeed."

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