

Hollow-core optical fiber for quantum communication



Overview

Hollow core fibres (HCFs) are emerging as a revolutionary technology for quantum communications, particularly in the distribution of single-photon-based quantum keys. Recent demonstrations have highlighted several advantages of HCFs over traditional glass-guiding fibres. The early version of HCF based on photonic-bandgap guidance has not proven itself a reliable quantum. Although standard silica-core single-mode fibers (SMF) have seen significant advances in recent decades, current fiber-networks face capacity limitations due to increasing demand for lower latency and higher data rates per wavelength band [6,7]. However, glass imposes a fundamental physical limitation because light travels through it approximately 30 percent slower than through air. In standard silica. We address this by employing a hollow-core fiber engineered for low-loss transmission at quantum dot wavelengths, with measured loss of 0.65 dB/km and potentially as low as 0.



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Quantum repeater-based communication over standard single-mode fibre (SMF) is fundamentally constrained by attenuation and propagation delay. Recent advances in hollowcore fibre (HCF) offer

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Polarization purity and dispersion characteristics of nested antiresonant nodeless hollow-core optical fiber at near- and short-wave-IR wavelengths for quantum communications. I. AfxentiLijun Yu +5

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Hollow-Core Optical Fibers for Telecommunications and

Hollow-core optical fibers (HCFs) have unique properties like low latency, negligible optical nonlinearity, wide low-loss spectrum, up to 2100 nm,

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AWS Adopts Hollow-Core Fiber to Boost Data Speeds

This leap in fiber-optic infrastructure isn't just about speed. Because the hollow-core design drastically reduces signal attenuation, data can travel longer distances before requiring

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Polarization purity and dispersion characteristics of nested ...

A newly emergent HCF technology, known as Nested Antiresonant Nodeless Fiber (NANF), demonstrates a significant reduction in confinement losses. This improvement is achieved by

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VIAMI Announces Industry's First Long-Range Hollow

Viavi launches an all-in-one hollow core fiber tester for OTDR, PMD, CD and AP, validated with three hyperscalers and built for long-range AI links.

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Hollow-core Fibers Market Size, Trends, 2026-2033 Forecast

The integration of hollow-core fibers into emerging applications such as quantum key distribution, space-based communication, and autonomous vehicle networks presents substantial

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Adjacent nested 4-tube hollow-core anti-resonant fiber

The 4-tube hollow-core anti-resonant fiber to achieve lower loss single-mode transmission by adding nested adjacent inner tubes. Significantly, the loss spectrum of 4-tube 4AN-ARF has a

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(PDF) Quantum Communication with Quantum Dots Beyond Telecom ...

We address this by employing a hollow-core fiber engineered for low-loss transmission at quantum dot wavelengths, with measured loss of 0.65 dB/km and potentially as low as 0.12 dB/km

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Hollow Core Fiber Market 2025

Growing Demand for High-Speed Communication – Increasing adoption of high-speed optical networks is propelling the demand for hollow core fibers. Advancements in Laser Technology – High-power

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Impact of Higher-Order Modes on Mode Field Diameter Measurement

We systematically investigate the influence of higher-order modes on the mode field diameter measurement of hollow-core fibres using the S2 technique. The effects of various experimental

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Antiresonant Hollow-Core Fiber in Quantum Comms

Hollow core fibres (HCFs) are emerging as a revolutionary technology for quantum communications, particularly in the distribution of single-photon

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OFC 2025 Concludes in San Francisco

Hollow Core Fiber: One of the most talked-about innovations on the show floor was the emergence of hollow core fiber (HCF) technologies, which promise to revolutionize optical

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Hollow-Core Fibers (HCF): The Next Frontier in Optical

Introduction For decades, optical fibers have relied on a solid glass core to guide light and have formed the backbone of global telecommunications. However,

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Specialty Optical Fiber Cable Market Size, Trends, 2026-2033

Emerging segments such as hollow-core fibers are gaining attention for ultra-low latency applications, especially in quantum computing and high-frequency trading.

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Hollow-core Photonic Crystal Fiber technology

GLOphotonics designs and produces gas-phase photonic components based on an innovative hollow-core micro-structured optical fiber technology.

Aug 12, 2025

Hollow core fiber occasions a paradigm shift in testing

Hollow core fiber marks a turning point in fiber technology. But first, there are obstacles to overcome In Sept, 2025, Microsoft Azure announced it is

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Quantum Communication With Quantum Dots Via Hollow-Core

This research demonstrates a significant advance in quantum communication through the successful transmission of single photons via a specially engineered hollow-core fibre.

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Microsoft's hollow core fiber delivers the lowest signal

Microsoft has achieved a breakthrough in the hollow core fiber technology, reducing data transmission loss to just 0.091 dB per kilometer, the

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Wavelength Allocation in Hollow-Core-Fiber-Based Future Quantum

In this paper, we present a quantum-secured optical fronthaul architecture utilizing hollow-core fiber and propose op-timized wavelength allocation for classica

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News | VIAVI Announces Long-Range Hollow Core Fiber Bidirectional ...

Hollow core fiber technology is being increasingly adopted for data center interconnect between hyperscale campuses for AI, high-frequency financial trading, quantum communication, defense and

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Quantum Communication with Quantum Dots Beyond Telecom

In this letter, we propose and demonstrate a novel approach using hollow-core fibers (HCFs) with widely separated low-loss windows to transmit strong classical light at 1550 nm alongside QD single

Jun 06, 2026

Coexistence of entanglement-based quantum channels

We experimentally demonstrate the coexistence of three entanglement-based quantum channels with carrier-grade classical optical

Contact Us

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