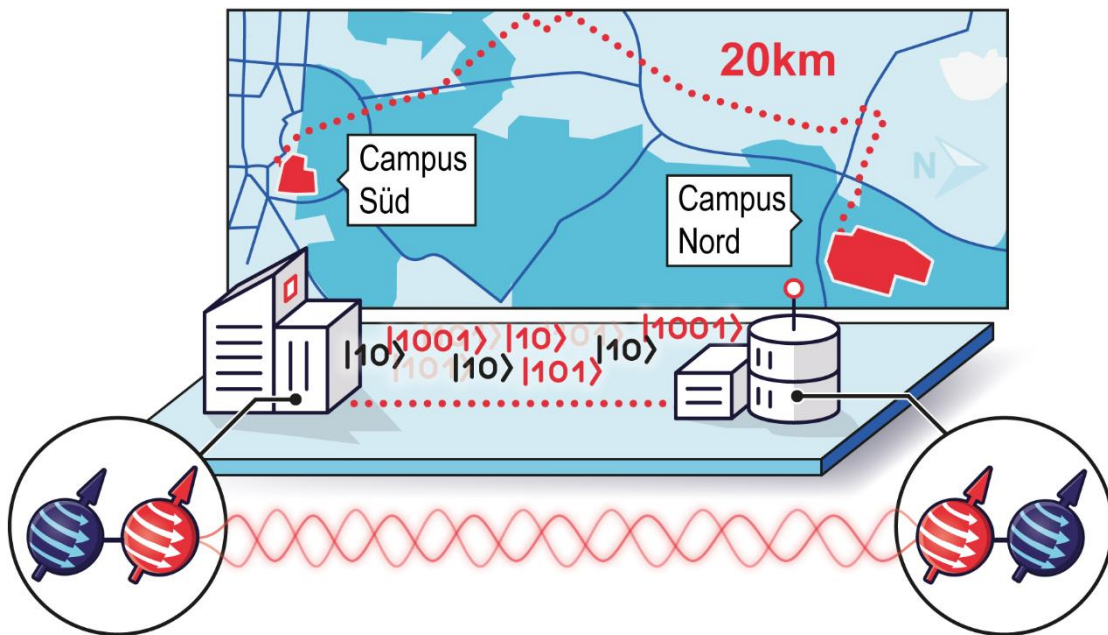


## Karlsruhe Quantum Communication Fiber Testbed



The testbed connects several labs at Campus South and Campus North at KIT, spanning a deployed fiber link of more than 20km. It serves as a central infrastructure to test and develop further Quantum Key Distribution (QKD) protocols and hardware, to investigate single photon source operation and entanglement distribution in telecom networks, and to demonstrate practically relevant use cases.




KIT Fiber Quantum Link

### A: Brief Information

<b>Testbed Title</b>	Karlsruhe Quantum Communication Fiber Testbed
<b>Start Point</b>	South Campus of the Karlsruhe Institute of Technology (KIT), Karlsruhe
<b>End point</b>	North Campus of the Karlsruhe Institute of Technology (KIT), Karlsruhe
<b>Institution/Organization</b>	KIT
<b>Contact</b>	Prof. Dr. David Hunger, <a href="mailto:david.hunger@kit.edu">david.hunger@kit.edu</a> Prof. Dr. Sebastian Randel, <a href="mailto:sebastian.randel@kit.edu">sebastian.randel@kit.edu</a>
<b>Status</b>	active

## B: Technical Information

<b>Type of Transmission</b>	dark fiber
<b>Length [km]</b>	22
<b>Losses [dB]</b>	7.5
<b>Supported Wavelengths [nm]</b>	1330 nm (O-band) to 1550 nm (C-band)
<b>Type of Fiber</b>	single mode
<b>Type of Deployment</b>	underground
<b>Polarization Stabilization</b>	No
<b>Quantum Communication Infrastructure</b>	<p>CV-QKD testbed at 1550 nm, <a href="#">KEEQuant Andariel</a>, single photon sources (SnV centers, Defects in SiC, Carbon Nanotubes, Quantum Dots, Molecules), quantum frequency conversion will be set up; spin-photon entanglement in preparation</p> <p>Superconducting nanowire single photon detectors @ 1550nm</p> 
<b>Available Infrastructure for external Parties</b>	access upon request and agreement

## C: Additional Information

<b>Linked Projects</b>	<ul style="list-style-type: none"><li>• QR.N: <a href="https://www.forschung-it-sicherheit-kommunikationssysteme.de/projekte/quantenrepeater-net-qr.n">https://www.forschung-it-sicherheit-kommunikationssysteme.de/projekte/quantenrepeater-net-qr.n</a></li><li>• QR.X: <a href="https://quantenrepeater.link/">https://quantenrepeater.link/</a></li><li>• DE-QOR: <a href="https://www.forschung-it-sicherheit-kommunikationssysteme.de/projekte/de-qor">https://www.forschung-it-sicherheit-kommunikationssysteme.de/projekte/de-qor</a></li></ul>
<b>Press Release and Publications</b>	<ul style="list-style-type: none"><li>• <a href="#">Quantum Network for Secure Communication</a>, 01.2025</li><li>• <a href="#">Neue Glasfaser-Teststrecke für Quantennetzwerke</a></li></ul>
<b>Demonstrated Milestone</b>	<ul style="list-style-type: none"><li>• successful key generation in a continuously running mode of a CV-QKD system across 20km</li></ul>
<b>Outlook</b>	<ul style="list-style-type: none"><li>• advanced CV-QKD, test of new QKD hardware;</li><li>• transmission of single photons;</li><li>• transmission of spin-photon entanglement;</li><li>• spin-spin entanglement</li></ul>

<b>Suggested Use Cases</b>	<ul style="list-style-type: none"><li>• QKD encryption of campus communication</li><li>• Securing communication of critical infrastructure such as distributed power networks</li><li>• entanglement distribution to connect quantum processors</li><li>• quantum repeater operation to extend range of entanglement distribution</li></ul>
<b>Other Comments/ Information</b>	



KEEQuant System for CV QKD demonstration across the KIT Quantum Link



Optical Millikelvin Cryostat with integrated tunable microcavity platform for efficient spin-photon interfaces and quantum repeater nodes