Fraunhofer IIS Dresden Quantum Communication Fiber Testbed

This testbed is continuously used by Fraunhofer IIS for quantum electronics development and testing as well as for scientific research. It is also available to all potential partners from industry and academics.

A: Brief Information

Testbed Title	Fraunhofer IIS Dresden Quantum Communication Fiber Testbed
Start Point	Fraunhofer IIS, Dresden
End Point	Fraunhofer IVI, Dresden
Operator	IIS with SachsenGigaBit GmbH
Contact	Dr. Stefan Krause: stefan.krause@eas.iis.fraunhofer.de
	Dr. Mandy Grobosch: mandy.grobosch@iis.fraunhofer.de
Status	active

B: Technical Information

Type of Transmission	dark fiber
Length [km]	10 km loop (20 km with circulator)
Losses [dB]	6.3 (13.7) @ 1550 nm

Supported Wavelengths [nm]	O-band (1310 nm) to C-band (1550 nm)
Type of Fiber	single mode
Type of Deployment	underground
Polarization Stabilization	Yes
Quantum Communication Infrastructure	• entangled photon source @ 810 nm and @ 1550 nm; • single photon detectors @ vis and @ 1550 nm; synchronization equipment; • time tagger; • analyses modules for polarization and time-energy entangled photons
Available Infrastructure for external Parties	access upon request and agreement; available infrastructure: access to entangled photon source, single photon detectors, electronics and analyses optics, internet

C: Additional Information

Linked Projects	• Q-NET :https://qunet-initiative.de/ • Projekt MoNeQua: https://www.eas.iis.fraunhofer.de/de/anwendungsfelder/mikroelektronik/monequa.html • Projekt MoNeQua II: https://www.eas.iis.fraunhofer.de/de/anwendungsfelder/mikroelektronik/monequa2.html • 6G-QuaS: https://www.forschung-it-sicherheit-kommunikationssysteme.de/projekte/6g-quas
Press Release and Publications	• Application Center Quantum Communication with new services, 02.2023 • Quantum Technology to Safeguard the Future of Confidential Information Exchange • Erste erfolgreiche Probeläufe zur quantengesicherten Datenübertragung in Sachse, 03.2022
Demonstrated Milestone	• photonic entanglement (polarization and time-energy) distribution over 20 km of deployed fiber

Outlook	• test bed for QKD software development; • test bed for microelectronics development for photonic quantum technologies; • super dense coding experiments; • space division multiplexing with classical signals; • quantum synchronization studies
Suggested Use Cases	• Damping tests under realistic conditions • Test of optical and electronic components for external partners
Other Comments/ Information	This testbed will be extended towards an inter-city link between Dresden and Chemnitz and potentially to Fraunhofer IOF in Jena.