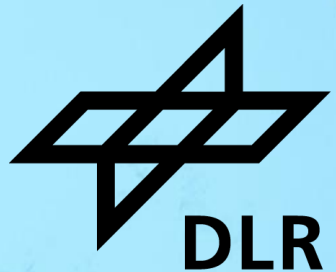


FSO & DLR OGSOP for SPACE-CRETE

Amita Shrestha et. al
Institute of Communications and Navigation
German Aerospace Center (DLR)



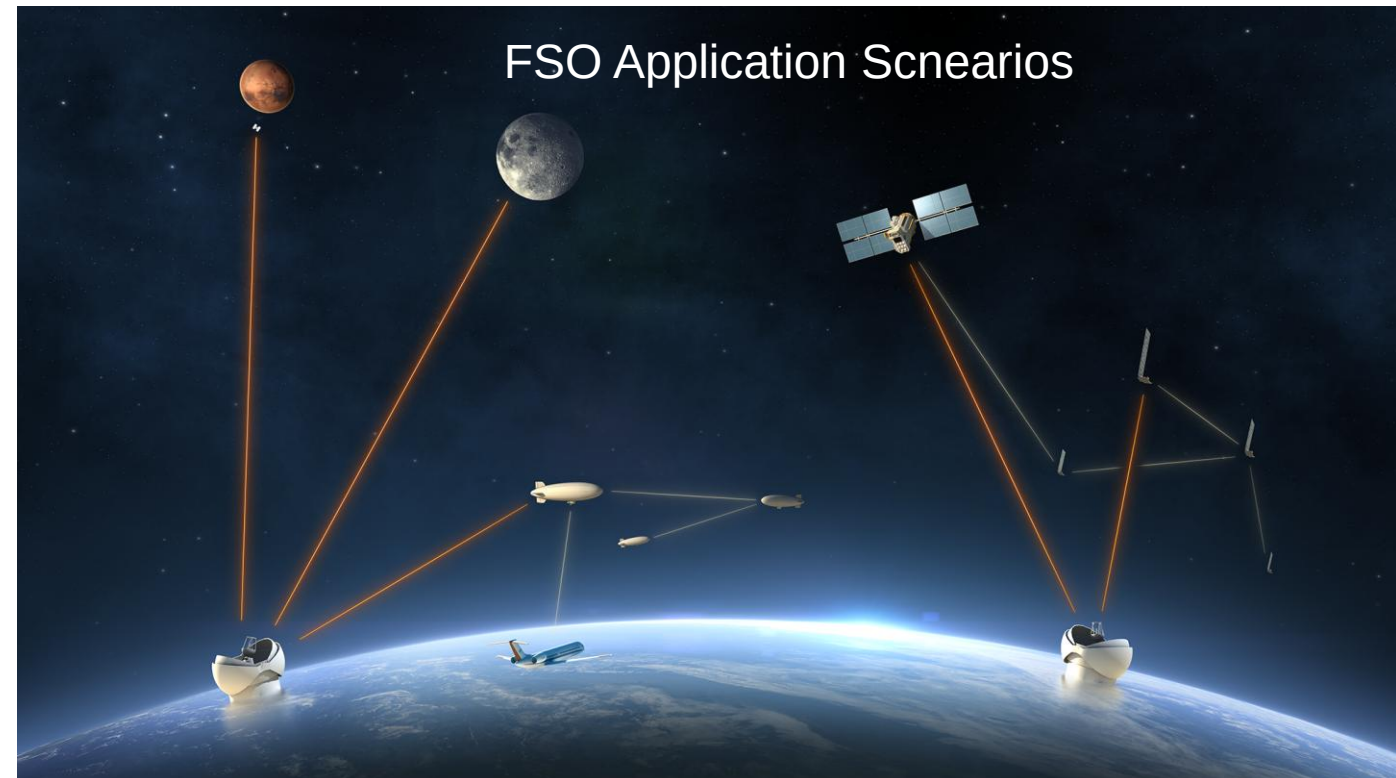
Motivation & Challenges for free-space optical satellite links

■ Advantages

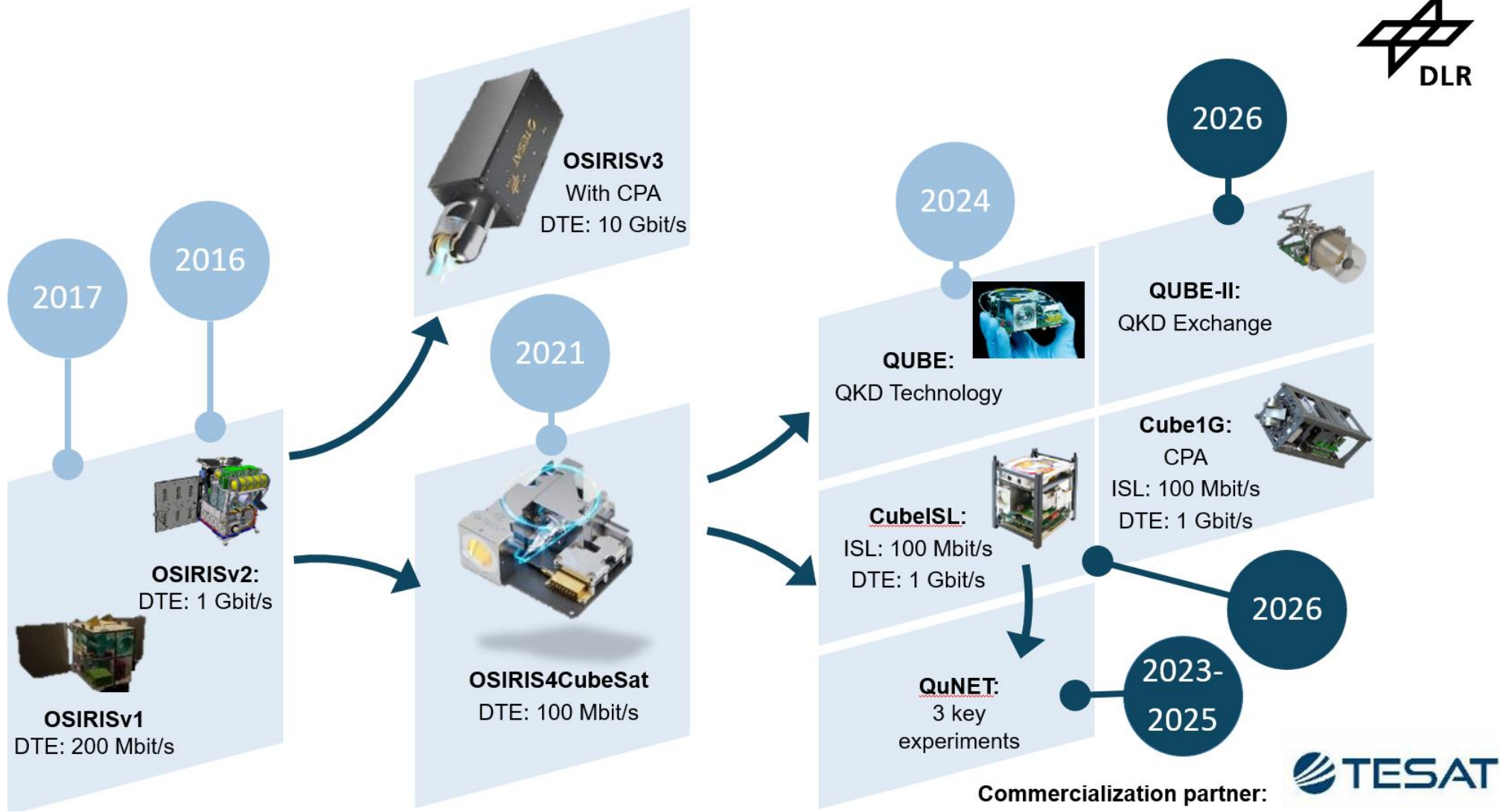
- High data rates – 1 Gbps to potentially $\gg$ x Tbps
- Enabler for highly-precise **optical time-transfer and ranging and quantum key distribution**
- No spectrum regulation
- Excellent power efficiency
- High data security

■ Challenges

- Precise beam pointing & control required
- Atmospheric effects
- Limited availability of ground stations (due to clouds) → requires OGS network



LEO-Downlink terminals: DLR OSIRIS



Optical Ground Station Oberpfaffenhofen



Improved performance and sensitivity

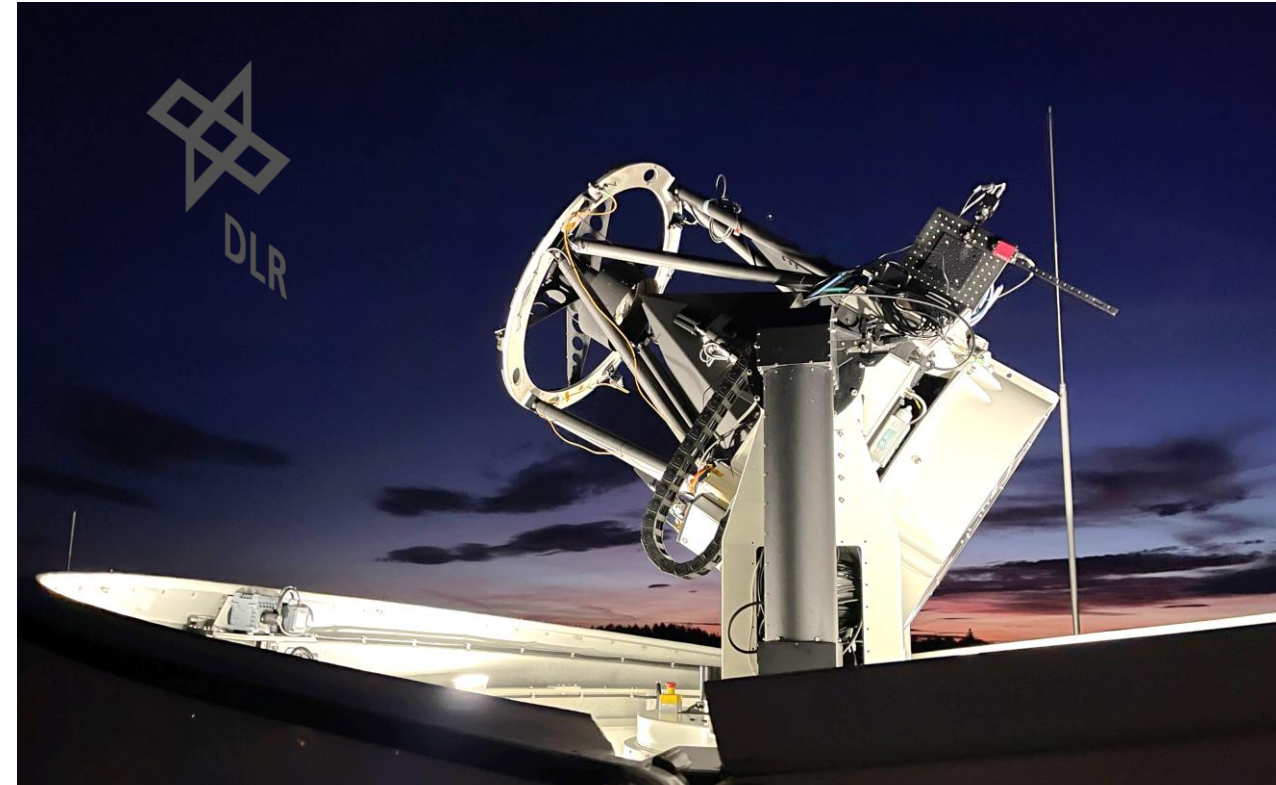
- 80 cm aperture - measurements with better spatial resolution
- Supports links in GEO-, deep space- and quantum key distribution-applications

Multiple foci, including Coudé

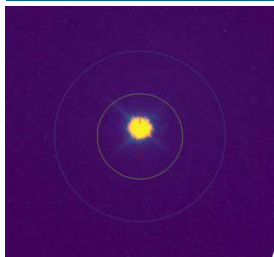
- High flexibility to change between setups, enabling multi-mission support
- More space for Science - Adaptive Optics on Coudé-Bench

Characterization of the atmosphere

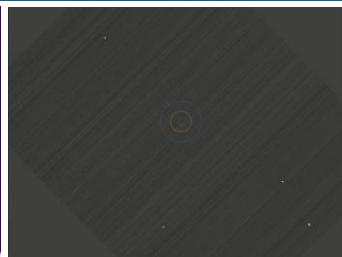
- Measurement instruments for recording of key atmospheric parameters



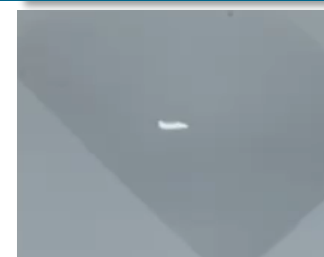
Installed in 2021, commissioned in 2022



QUBE First light



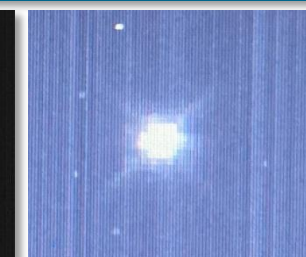
PIXL-1 First light



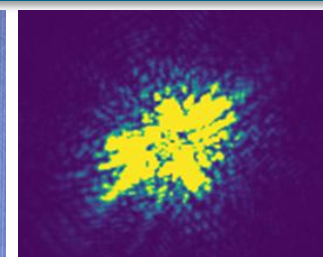
Do-228 tracking



ISS

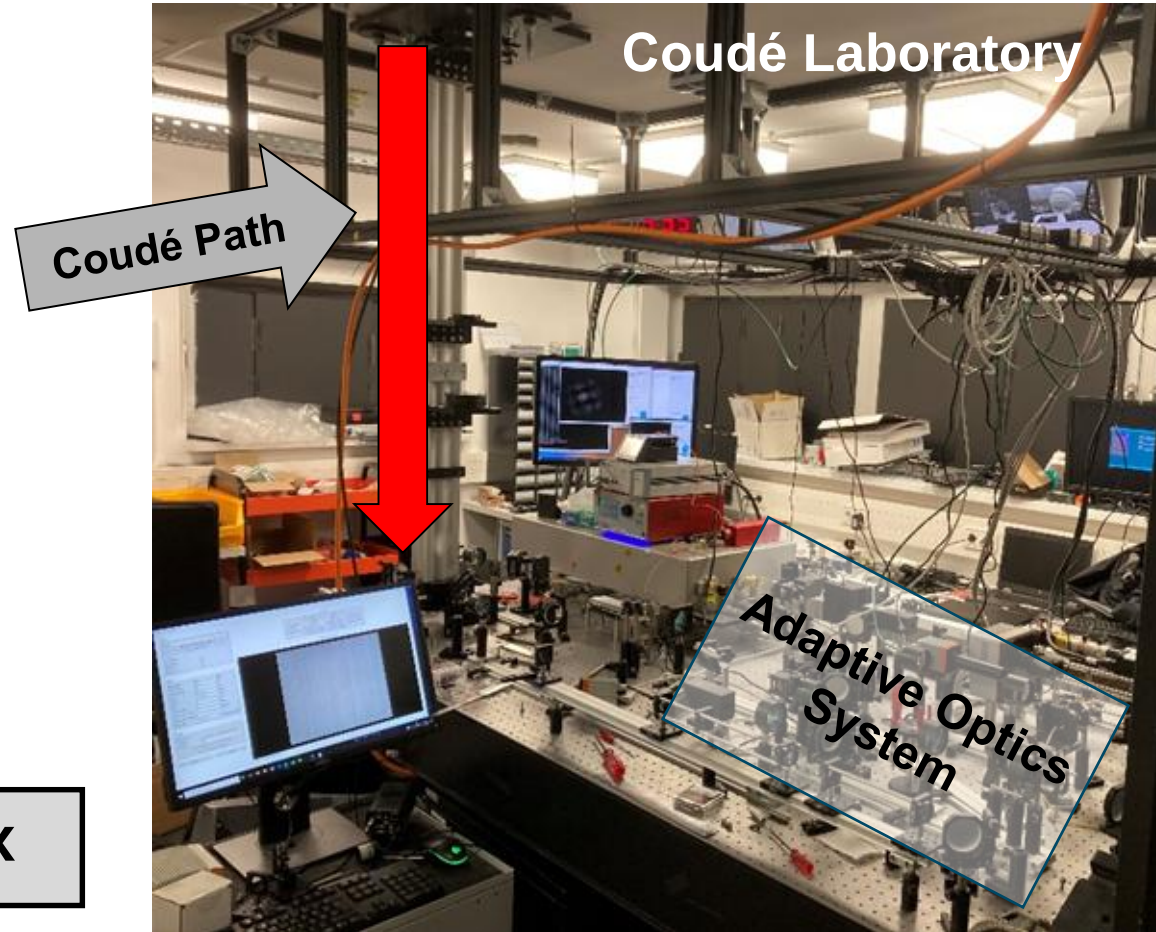
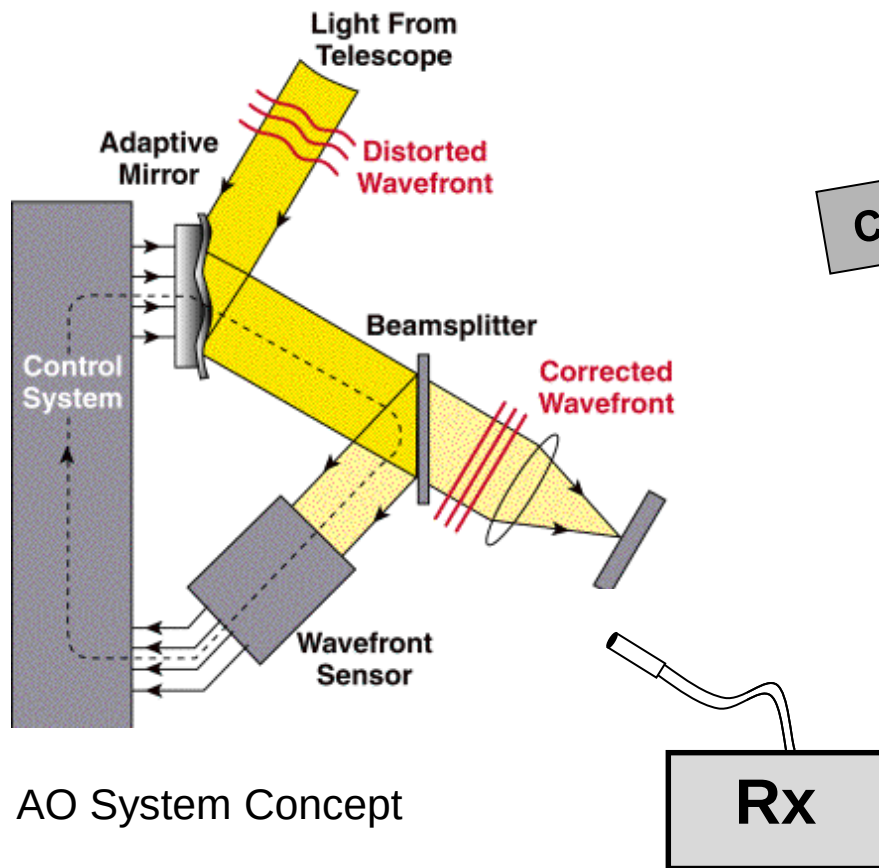


Flying Laptop



Alphasat

OGSOP – Coudé room with adaptive optics



Meas. with
Alphasat-LCT

Without AO



With AO



- For downlink → Post Compensation
- For Uplink → pre-compensation
- Issue → Point Ahead Angle

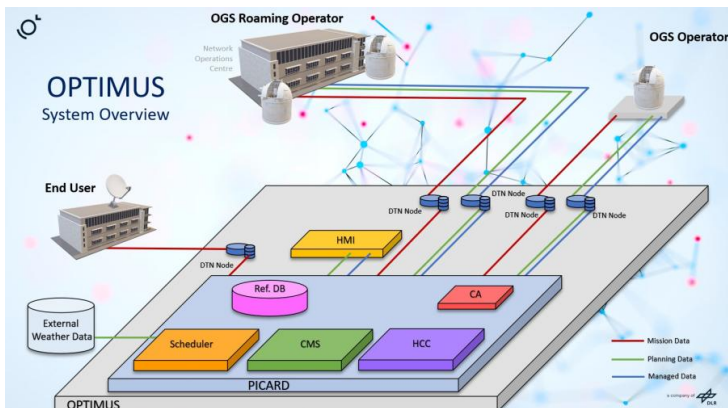


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und Technologie

OGS usage in various Projects/Missions

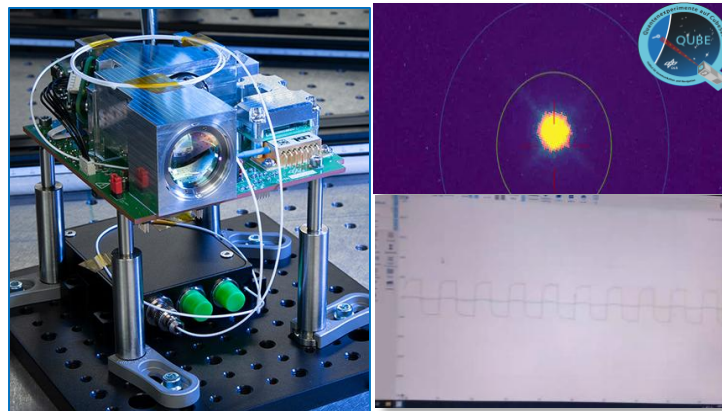
OGS Network Testbed

- Interoperability
- Link planning



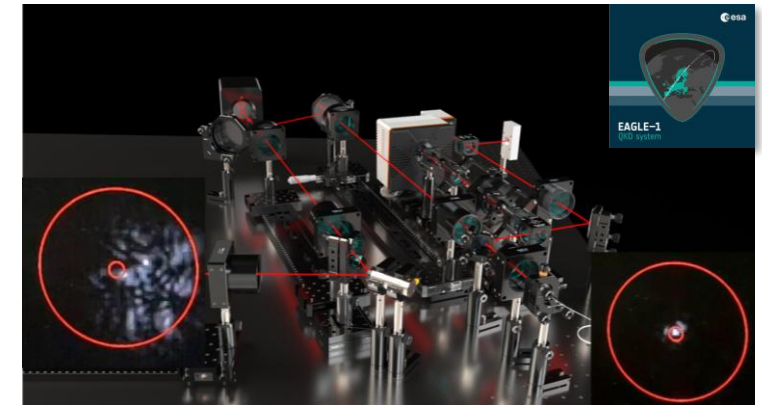
QUBE

- Experiments with QUBEI
- Planned experiments with QUBEII for QKD key exchange



QKD OGS: Eagle-1 IOT OGS

- High-performance AO and WL diversity uplink system
- QKD missions



- Validation OGS for various satellite missions like PIXL, cubeISL, Cube-1G etc.
- OGS as a service planned for various missions like Hydron, OPSTAR etc.

OGS usage in various Projects/Missions

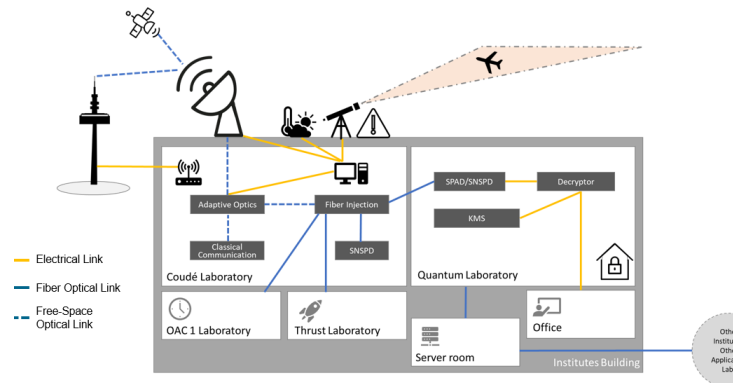
QuNet

- QKD Network
- Key Experiments



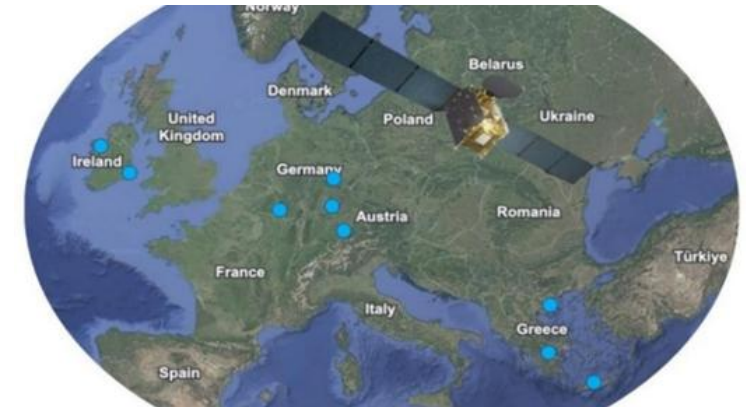
QuKomIn

- Interoperability
- Application Laboratory Network



EuroQCI Projects

QuGNOPS + TransEuroOGS



- Looking forward to connecting to other Ground stations in Greece 😊

DLR Ground Stations



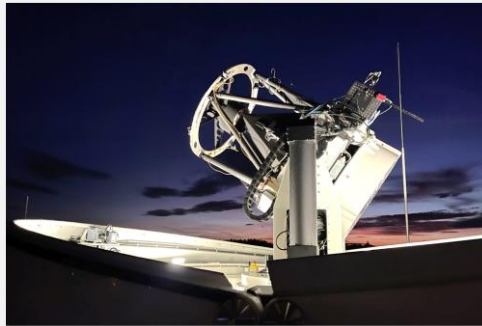
Station	Location	Operational Readiness	Aperture	Uplink Beacon (baseline)
FOGATA	Tabernas, Almeria	Q2-2024	600-mm	1590-nm
LaBoT	Trauen, Fassberg	Q2-2024	700-mm	1590-nm
OGSOP	Oberpfaffenhofen, Munich	Running	800-mm	various
OGSTB	Oberpfaffenhofen, Munich	Q1-2024	304-mm	1590-nm, 1560-nm, 967-nm
TOGS	Mobile	Running	600-mm	various

DLR IKN Contributions to Space Crete



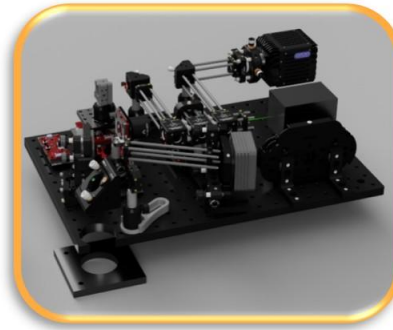
OGS development

- Preparation of the high-level OGS system architecture document
- Development of OGSOP to prepare for the combined demonstrations campaigns+experiments



Joint Experiments

- Channel Measurement – Horizontal Link
- Site Characterisation
- Interoperability test – DLR OGS + FORTH
- Demonstration of **Compact AO**



Data Analysis

- Data Analysis of the results of different campaigns
- Combined publications



Contact

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↪ [LinkedIn](#) / [Optische Bodenstation OGSOP](#)

THANK YOU
We look forward to our collaboration

Imprint



Topic: **DLR OGSOP**

Date: 2026-10-02

Author: Amita Shrestha et. Al.

Institute: Institute of Communications and Navigation

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