Quantum entanglement communication From ground to space!

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AUREA TECHNOLOGY

EPIC European Photonics Industry Consortium

About AUREA Technology SAS

- **EU 27 and ESA-member deeptech SME**
- **Strong Industrial and high-level Quantum background**
- **Key building-blocks for Quantum Communications**
- **Strong recognition with many Innovation Awards**
- **> 300 customers worldwide**

EU 27 countries

Leading provider of QKD sub-systems

Key building-blocks for both

Ground and Space ultra-secure QKD communications

Entangled Photon Sources *Single Photon Detectors* *Time Correlators*

NEW Entangled Photon Sources for Space

Terrestrial and Optical Ground Station

Space

Euro – Quantum Communication Infrastructure

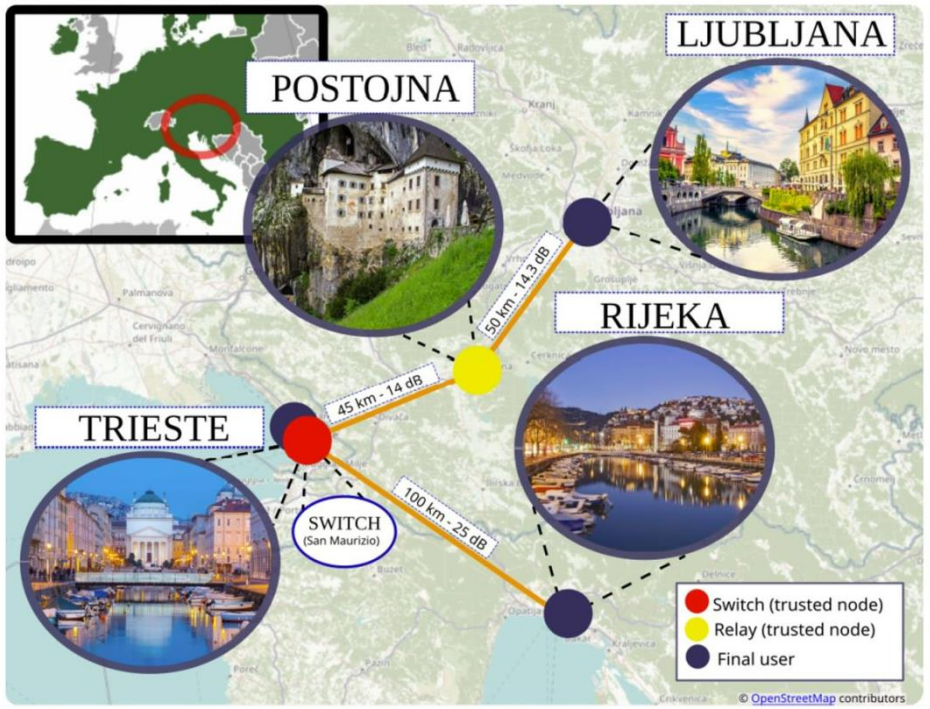
European digital sovereignty and secured communication across all EU countries

- **2020**
  - openQKD
  - Basics for quantum security
- **2021-22**
  - Build national quantum networks
  - Cross-borders links
- **2022-23**
  - Link countries across EU using satellites

The first « made in EU-27 » inter-countries QKD network

Largest inter-countries QKD Network, by using « made in EU-27 » suppliers

- **This first QKD network deployment between three European countries** paves the way for the European Quantum Communication Infrastructure (EURO-QCI)
- **European countries: Italy – Slovenia – Croatia**
- **Crow fly distance up to 100km between cities**

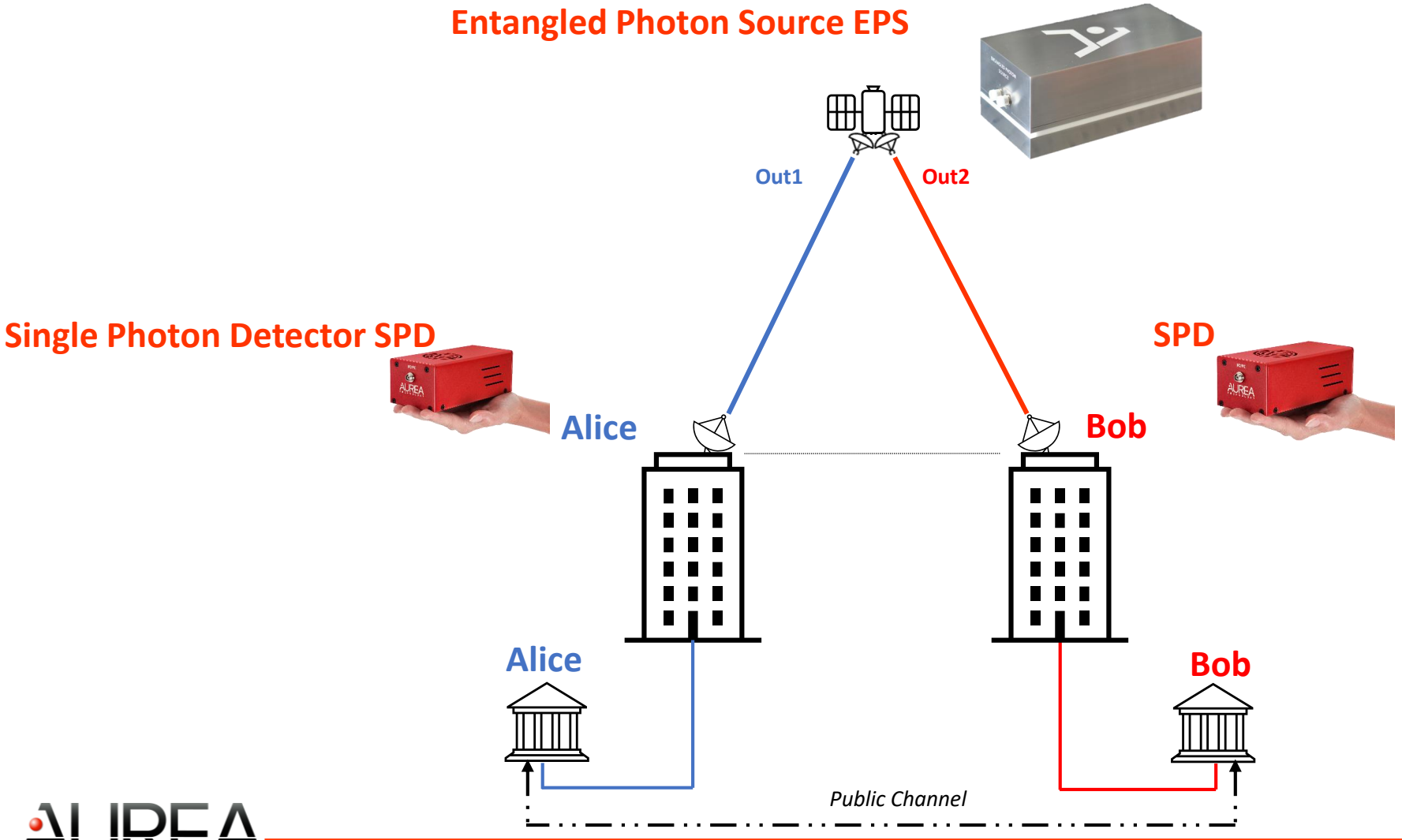


High-performance Entangled Photon Source for Space QKD

SAGA mission: Quantum communication systems with pan-European reach for ESA missions

- **High performance Entangled Photon Source Demonstration Model**
- **Space based Entangled Photon Source**
- **100% EU Technology**
- **Quantum communication link at 1550 nm – C band**
- **Objectives:**
  - Generation rate > 1 GHz
  - Transmission Key Rate > 10 bits/s @ 60 dB attenuation

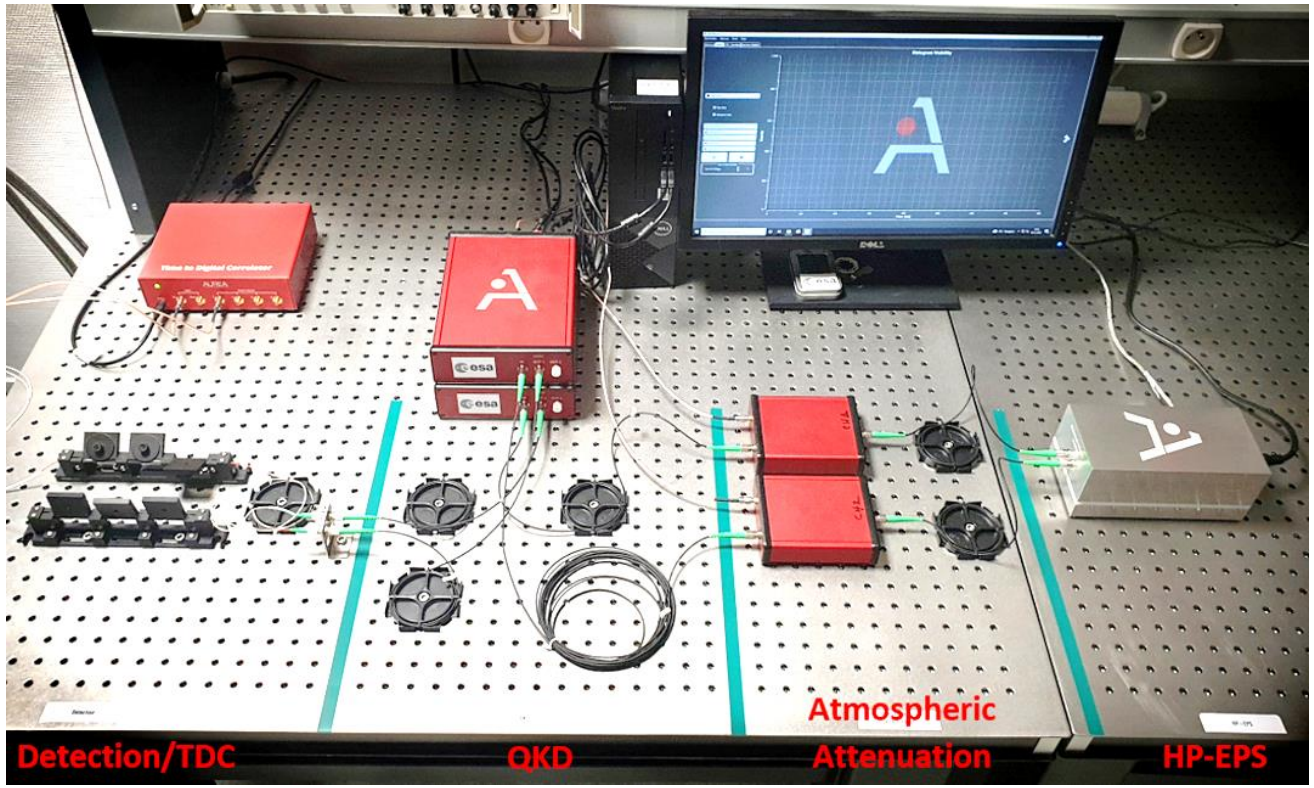
Next step: Entangled Photon Source for Space QKD



- Satellite sending two photons to two different ground stations
- Basic principle scheme for space QKD
- Reconciliation between Alice and Bob
- Use of classical available infrastructures

Entangled Photon Source for Space QKD

Towards a high performances, time energy entangled photons source for space QKD



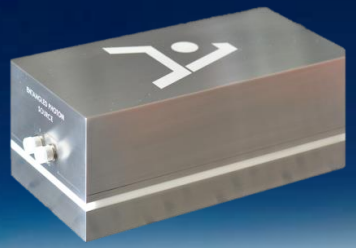
In lab simulation for atmospheric impact on communication with according attenuation

The bench is developped to simulate LEO and GEO configurations

Simulate the whole link, from emission to detection

Conclusion: Ground and Space for industrial QKD

Space:
NEW Entangled Photon Source under development



Ground:
Single Photon detection & Entangled Photon Source

Ground Station 1

Secure Key Exchange

Ground Station 2

Single Photon Detection

Single Photon Detection

THANK YOU!

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