Wednesday 20th May 2026

Giuseppe Vallone (Padova), "Long-distance quantum communication in Space"

Tristan Valenzuela-Salazar (RAL Space), "CAITDM: Cold atom interferometer for thermospheric density measurements"
The CAITDM programme aims at deploying a cold atom based accelerometer in low earth orbit to enable density measurements in a region of the atmosphere, 300km to 400km, where in-situ density data are sparse. The objective of the programme is to fold, on the one hand to provide a relevant data set for atmospheric scientist to enable the refinement of current atmospheric models and on the other hand to serve as a technology demonstrator for future high specification space deployable quantum sensors. In this presentation we will provide and update of the status of the project recently completed to produce a functional breadboard of the physics package at the heart of the 16U CubeSat planned for the mission. We also will present the status of the electronics control system being developed for deployable space quantum devices.

Matthias Zimmermann (DLR), "Advanced Quantum Networks: Future Applications and Technology Demonstrations"
Classical communication is the basis for many of our current and future technologies, such as mobile phones, video conferences, autonomous vehicles and particularly the internet. It is not unlikely, that quantum communication and quantum networks might open up novel opportunities on a similar scale. Governed by the basic laws of quantum mechanics, quantum networks might offer enormous benefits for security applications, more precise measurements, faster computations, and many other fields of application by interconnecting different quantum devices, such as quantum sensors, quantum computers, or quantum memories [1]. In this talk, we provide an overview of ongoing research activities in our group regarding quantum information networks and their future opportunities as enhanced by optical satellite links. In particular, we address topics such as blind quantum computing, quantum authentication, a development roadmap for quantum networks and technology demonstrations. Moreover, we present steps towards establishing an entanglement¬-based quantum information network in Ulm, Germany, and beyond.
[1] B. Kubala et al., Advanced Quantum Communication and Quantum Networks, arXiv:2602.06781v1 (2026).

Rainer Kaltenbaek (Ljubljana), "MAQRO"

Isabella Cerutti (JRC, EC), "Lorentz transformations in quantum space links"
Quantum transmissions in space undergo special relativity effects due to satellites' orbits. Using Lorentz transformations, these effects can be modelled and computed. The presentation focuses on the exact derivation of Wigner rotation angle for polarized photon states.

Frédéric Grosshans (Sorbonne), "Quantum Satellite Networking research at Sorbonne Université"
I will present a brief review of the research effort of Sorbonne Université's LIP6 team on networks satellite, including the evaluation of the performance of optical satellite links, their effect on

quantum key distribution and entanglement swapping, as the specific problems satellite mediated links pose to a quantum network

Christoph Marquardt (MPL), “Quantum Communications from Space: Lessons Learned”

Rain K. C. Wang (Boeing), “Boeing for a Global Quantum Internet”
Boeing’s mission—to connect, protect, and explore the world and beyond—drives our commitment to advancing quantum technologies that will redefine sensors, computing, and networks. To support this objective, Boeing is spearheading a first-of-its-kind, entanglement swapping satellite mission: Q4S. Standing for Quantum-4-Swapping, the pathfinding satellite has demonstrated record entanglement swapping metrics on a compact, space-qualified payload. It is designed to operate within strict space and power constraints for launch and on-orbit demonstration of over a year. Driving Q4S alongside parallel space-based networking efforts including QORGI: small, scalable hybrid communication ground stations, Boeing is committed to scaling quantum communication at large.

Josefine Kraus (TUM), “QUICK3 satellite: Integrated multi-path-interferometer for fundamental physics tests in LEO”
The absence of atmospheric disturbances and microgravity itself renders space a unique platform for fundamental physics experiments. One such test concerns Born’s rule, which - despite its central role in quantum physics, relating the wavefunction to measurable outcomes - lacks a derivation from first principles. We have designed an optical three-path interferometer, capable to test up to second-order interference deviations from Born’s rule in an on-chip architecture based on laser-written waveguides and an integrated photon source in a two-dimensional material. After laboratory testing, the device was integrated into a 3U CubeSat and launched into LEO in June 2025, enabling a test of Born’s rule beyond terrestrial conditions.

Manik Dawar (Airbus), “Feasibility of large-scale entanglement networks”
A large- scale quantum network requires the distribution of high-fidelity end-to-end entanglement. To overcome the range limitations inherent to terrestrial fiber, a leading architecture has emerged: satellite-based sources transmitting entanglement to quantum repeaters on the ground. By bridging the gap between abstract analytical frameworks and computationally heavy numerical simulations, this paper provides the first quantitative answer to the question of such a network's achievable performance with current and near-term space technology, while accounting for entanglement swapping and purification. This is achieved by integrating a detailed physical model of a satellite-to-ground link into an analytical entanglement resource estimation framework for quantum repeaters, enabling an optimization of the end-to-end entanglement rate. Our analysis, performed across leading quantum hardware platforms, shows that Low Earth Orbit satellite constellations combined with quantum repeaters employing Neutral Atom or Nitrogen and Silicon Vacancy qubits, could enable a global quantum network, distributing entanglement over distances up to 20,000 km, sufficient for connecting any two points on Earth. This work highlights the major bottlenecks in space and quantum hardware technologies, which need to be addressed, thereby guiding informed investments necessary for enabling a large-scale quantum network.

Thursday 21st May 2026

Fabian Steinlechner (FSU, Fh-IOF Jena), “High-dimensional quantum communication in free space”

Patrick Ledingham (Southampton), “Ground-Station Quantum Memory for Space Quantum Communications”
Quantum memories are expected to become a key enabling technology for scalable satellite quantum networks, allowing probabilistic entanglement generation to be synchronised across long-distance links. In this talk I will present outcomes from a recent European Space Agency study on quantum memories for networks incorporating satellite links. I will give a brief overview of the state of the art in ensemble-based quantum memory implementations to motivate a proposed ground-station memory based on erbium-doped crystals operating at telecommunication wavelengths.

Daniele Dequale (ESA), “The QUASAR initiative: Extending quantum networks to space”
The European Space Agency has been driving the development of space-based quantum technologies for more than a decade, and several missions aimed at demonstrating satellite-based QKD are currently ongoing. More recently, the Agency has started investigating additional applications of quantum networks beyond QKD. This presentation will provide an overview of recent results, ongoing activities, and future plans toward the definition of the QUASAR mission for the 2028 Ministerial Council.

Luigi Santamaria (ASI), “Single photon spatial mode demultiplexing based Imaging and spectroscopy”
Direct imaging, the most commonly used technique for remote optical observation, is fundamentally constrained by the diffraction limit. Recent studies have demonstrated that this limit can be surpassed, even with passive optical systems, through interferometric far-field methods such as spatial mode demultiplexing (SPADE). I report our results on sub-diffraction imaging and spectroscopy of two incoherent point-like emitters in the single-photon regime using SPADE and embedding the results in a quantum information model.

Lukas Knips (LMU), “QUBE-II - Quantum Key Distribution with a CubeSat”
Quantum Key Distribution (QKD) is a method to securely share cryptographic keys between two parties via a quantum channel. To enable global QKD on a scalable platform, CubeSats provide an attractive approach. The QUBE-II mission, a joint research project by the Friedrich Alexander University Erlangen-Nuremberg (FAU), the Max Planck Institute for the Science of Light (MPL), the German Aerospace Center Institute of Communications and Navigation (DLR-IKN), Zentrum für Telematik (ZfT), OHB System AG, and the Ludwig Maximilian University Munich (LMU), is based on this platform and aims to demonstrate QKD. With a volume of about 8 liters, the satellite features amongst others a quantum random number generator, three QKD sender payloads, a full-stack postprocessing board, as well as an laser communication terminal. The QUBE-II satellite has been launched on 3rd of May 2026 with a SpaceX Falcon 9 rocket from Vandenberg Space Force Base. In my talk, I want to highlight the major milestones and achievements towards the launch and discuss the path for the following months.

Manuel Erhard (QT Labs), “Daylight QKD enabled by hyper-and high-dimensional entanglement”

Gabriele Riccardi (SES), “Securing the Post-Quantum Era – The Strategic Role of Satellite Quantum Key Distribution”
This presentation outlines SES’s response to the emerging quantum threat, highlighting ongoing initiatives and strategic developments. It will present the roadmap for advancing space-based quantum communications from early demonstrations toward the deployment of operational services.

Kannan Vijayadharan (Padova), TBA

Friday 22nd May 2026

Christian Fuchs (DLR),” Optical Link Technologies for Satellite based Quantum Key Distribution”

Siddarth Joshi (Bristol), “Space Platform for Optical Quantum Communication (SPOQC)”
The recently launched Space Platform for Optical Quantum Communication (SPOQC) has a dual wavelength weak coherent source for BB84 and DSP for QKD built by us at the University of Bristol. I will present the design and building of this payload as well as that of the mobile optical ground station.

Sushil Mujumdar (TIFR), “Scientific ballooning capabilities at TIFR, India”
In this presentation, we will first introduce our group's research activities on quantum communication, and follow up with a glimpse of the scientific ballooning center of our Institute that will be the crux of our upcoming project on long-distance free-space quantum key distribution using stratospheric balloons.

Daniel Rieländer (ESA), “From Academia to Industry and Real World Products”
This talk explores the transition of quantum communication technologies from academia to industry. Throughout my career at institutions such as ICFO, JPL, Fraunhofer, and ESA, I have worked at the interface between research and technology development, with the aim of maturing quantum technologies and narrowing the long standing gap between academic results and industrial impact. In industry success is ultimately measured by value creation and revenue. Quantum technologies, however, are still largely funded by public investment—paid for by future generations who are expected to benefit from them. This creates a responsibility: to develop technologies that are not only scientifically impressive, but also genuinely useful, trusted, and worth paying for. Historically, quantum research focused on foundational questions, such as demonstrating entanglement and closing loopholes in tests of quantum mechanics. To justify continued funding, attention shifted toward applications, giving rise to concepts like the quantum Internet—distributing entanglement over large distances via quantum repeaters. While elegant in theory, practical advantages remain unproven. Satellite based entanglement distribution has emerged as an alternative, enabling global links between distant ground stations. Yet even with entanglement in hand, the benefits for real

applications—quantum communication, sensing, or computing—are often unclear. Promising ideas include blind quantum computing, long baseline astronomy, and networked optical clocks, but achieving the required rates and fidelities remains a major hurdle. Security presents an additional challenge: trust must be earned by convincing cybersecurity experts who rely on rigorous mathematical proofs. This is often less a technical problem than an institutional and political one. The central question remains: what quantum technologies should we build today that our children will actually want to pay for tomorrow?

Simone Capeleto (ThinkQuantum), "Quantum Information: an industrial viewpoint"
In the last decades the maturity of quantum information has accelerated in the Terrestrial segment and Space QKD applications, leading to the creation and development of entrepreneurial initiatives that represent today a promising industrial segment. The review of such recent developments can contribute to imagine the evolutions and foreseen upcoming opportunities of Space Quantum Information from an Industrial viewpoint.

Andrea Geraldi (Thales Alenia Space), "Quantum technology for secure space communications"

Mustafa Gündogan (Humboldt), "Quantum memories for satellite links: prospects and challenges"
Long-distance quantum communication will likely rely on hybrid architectures that combine fiber networks with satellite links. In such networks, quantum memories would play an important role as interfaces between these different layers, while also helping to extend the achievable distance for untrusted node operation. In this talk, I will discuss possible use cases for quantum memories in satellite-based links, review the current state of quantum memory research, and compare different memory platforms in terms of their suitability for different applications.

Zeki Seskir (KIT), "Collaborating Under Constraints: Industrialising Space Quantum Technologies"
This contribution examines the practical limits of cooperation in space and quantum technologies, especially where national priorities, strategic capabilities, and security or defence interests are involved. It focuses on the tension between collaboration and competition, and on what that means for industrialisation in both sectors.