

Quantum Technologies in Space and for Space

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TÉCNICO LISBOA



instituto de
telecomunicações

Physics of Information and Quantum Technologies Group

- Based at Instituto Superior Técnico, Lisbon.
- Won 6 EU and 1 USA projects in the last 6 years.
 - Organized the first *Training Workshop on Quantum Technologies in Space*, Lisbon, September 2017.
- Involved in the networks and boards setting the S&T agenda for Space Quantum Technologies.



Chavalier Bagn

Lisbon Training Workshop on Quantum Technologies in Space, 11-14 September, 2017

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INTRODUCTION

The Lisbon Training Workshop is organized in the context of, and is supported by, the COST Action "[Quantum Technologies in Space](#)" (QTSpace, CA15220).

The Lisbon Training Workshop aims at establishing a common ground in know-how and expertise in state of the art developments by providing tutorials as well as hands-on training on the broadly defined topics of quantum communication, quantum-enhanced measurements, and tests of the foundations of physics. A Special Evening Lecture will be held on Wednesday 13 September by [Mark Kasevich](#) (Stanford University).

This pedagogical setting will set the stage to further the discourse between a wide variety of stake holders in space agencies and space industries as well as scientists from several scientific communities that have been pushing towards space applications of quantum technology in the recent past like quantum communication, atom interferometry, atomic clocks, quantum optomechanics and high-mass matter-wave interferometry.

These central topics will be covered in the scientific workshop held in the afternoon. In addition, there will be presentations by stake holders from space industry and space agencies, and there will be several panel discussions on exciting new developments in the field.

The unique combination of tutorials, training sessions and a scientific workshop will provide a perfect setting for networking among Early Career Investigators, leading scientists as well as stake holders from space agencies and space industry. The COST action "[Quantum Technologies in Space](#)" (QTSpace, CA15220) brings together a variety of communities from space agencies and industries as well as stake holders from the field of quantum technology.

Quantum Technologies in & for Space

Our research Group is active/interested in:

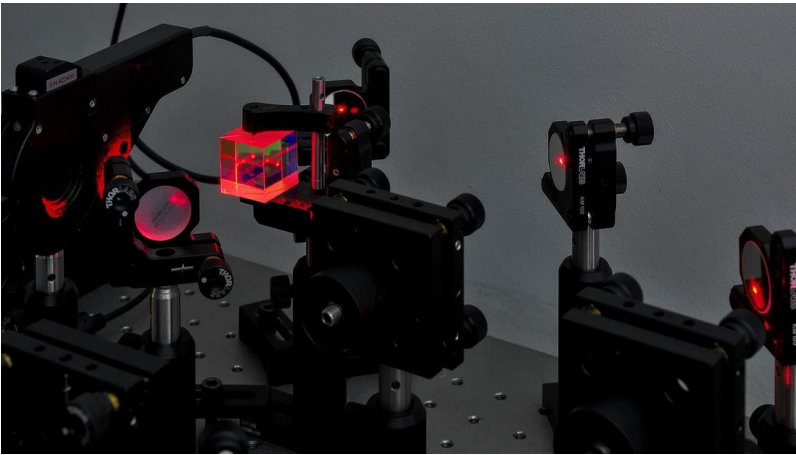
- **Quantum computation and simulation**
for earth observation big data, aerodynamics, etc.
- **Quantum communications**
satellite-to-ground and satellite-to-satellite, etc.
- **Quantum sensing and metrology**
navigation, geodesy, fundamental Physics, etc.

QuTe Lab – Quantum Technologies Laboratory

Bulk Quantum Optics.

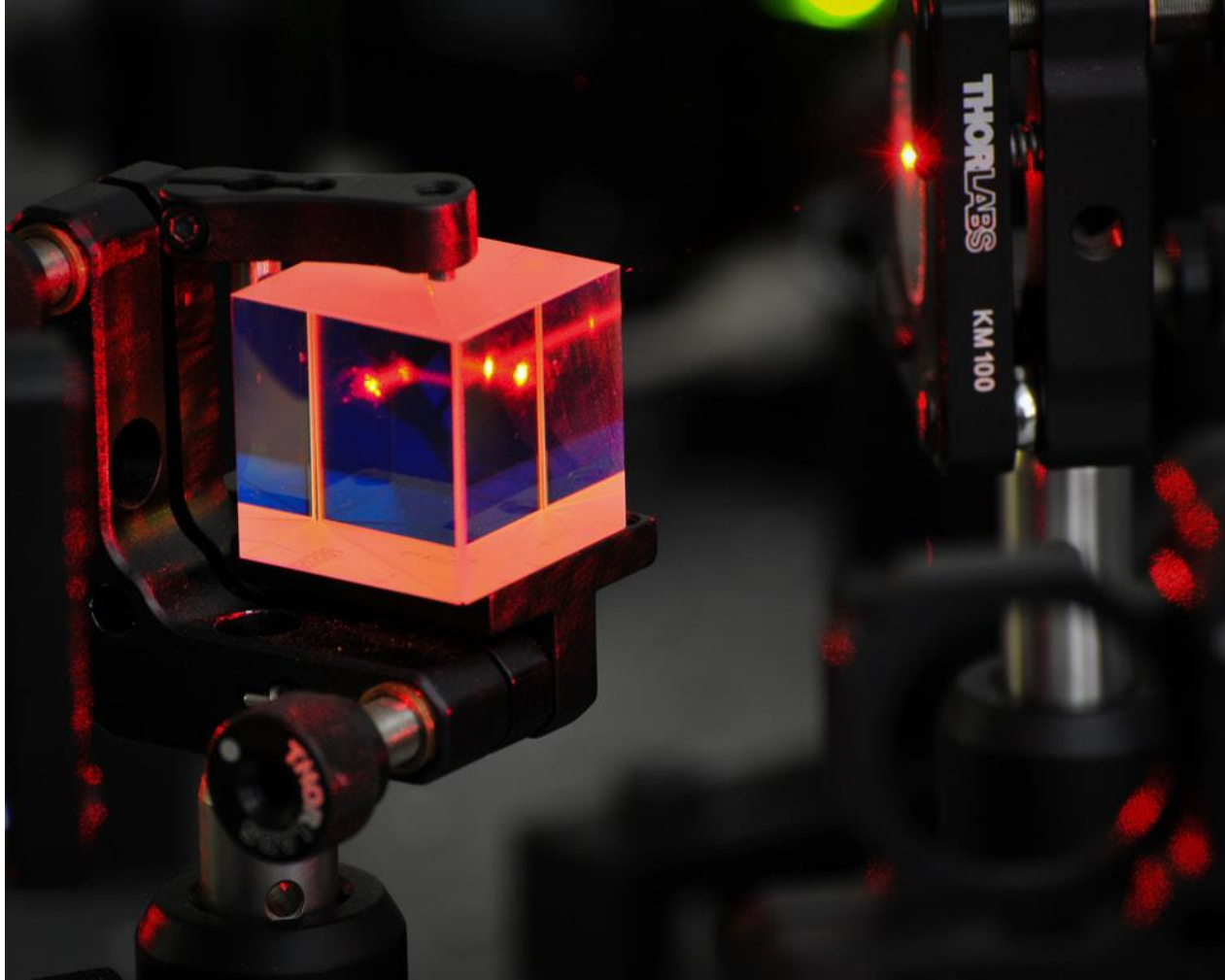
Integrated Quantum Photonics.

Free-Space Quantum Communications.



QuTe Lab – Quantum Technologies Laboratory
IT / IST, inaugurated on 15 February 2019.

QuTe Lab – Quantum Technologies Laboratory



Physics of Information and Quantum Technologies Group

www.phys-info.org

Quantum Internet

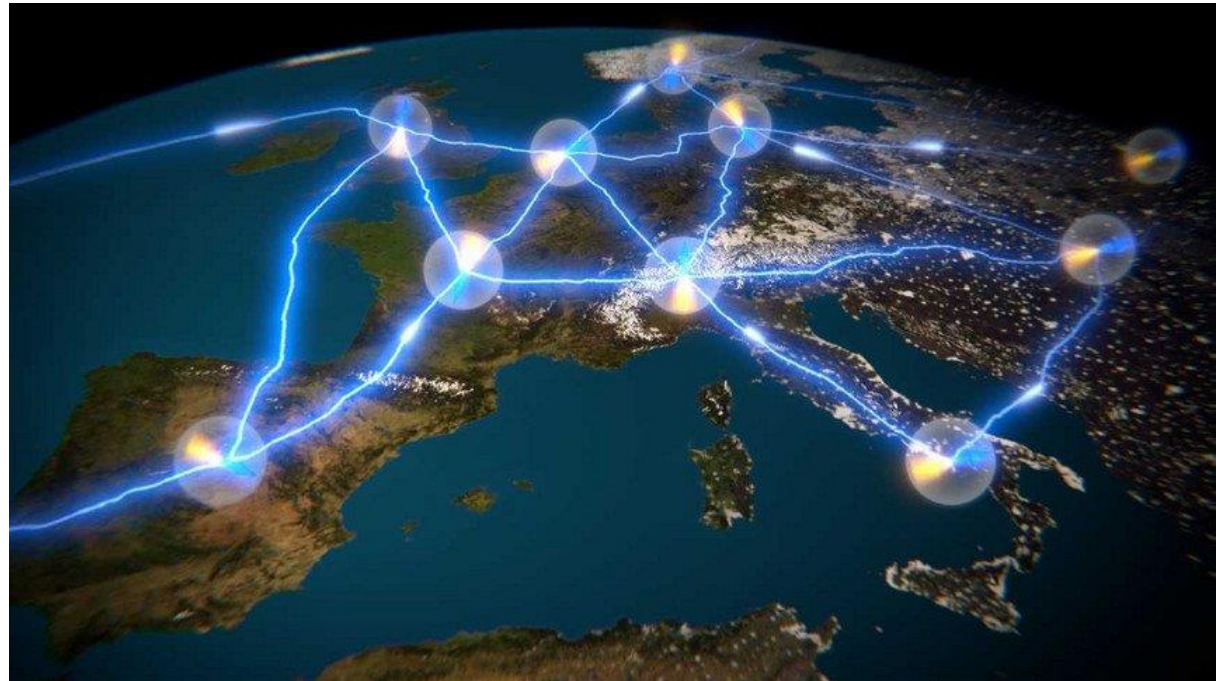
A network for quantum communications,
for connecting quantum computers,
for connecting quantum sensors,
for distributing metrological (time) standards.



**QUANTUM
INTERNET
ALLIANCE**



**QUANTUM
FLAGSHIP**



Quantum LAN (Local Area Network)

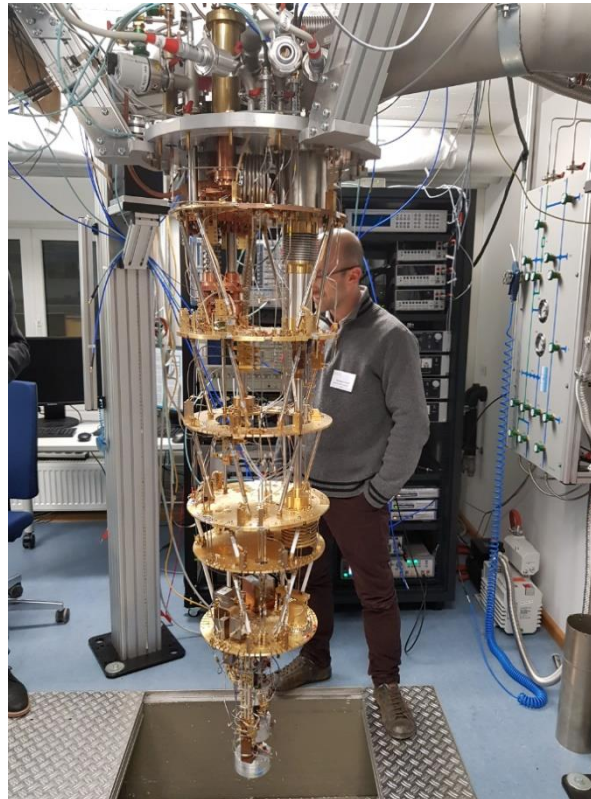
A local network connecting superconducting quantum processors using superconducting wave-guides... as well as free-space.



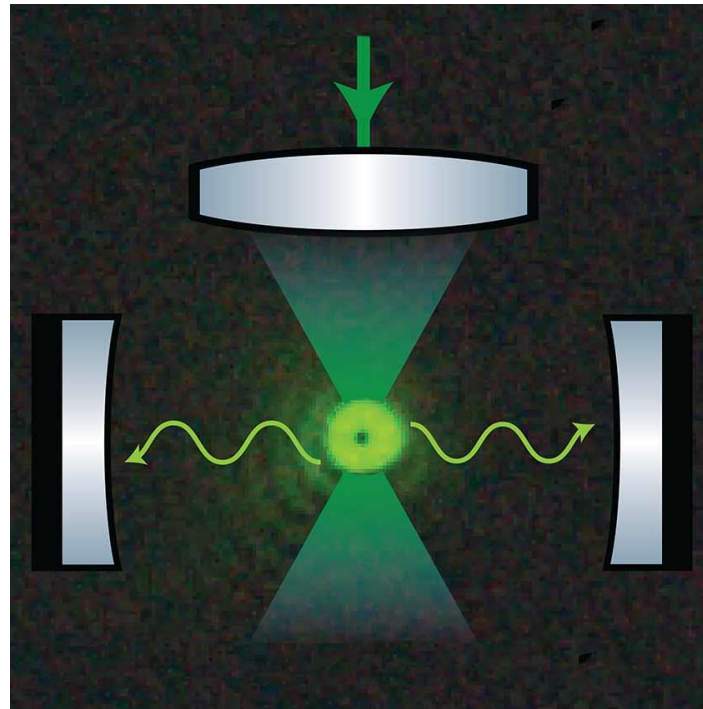
Quantum Microwave
Communication and Sensing



QUANTUM
FLAGSHIP



Measuring nanoscale displacements and forces



Aspelmeyer Group

QuantERA project

TheBlinQC – Theory-Blind Quantum Control



Horizon 2020
European Union Funding
for Research & Innovation



Doctoral Programme in the Physics and Mathematics of Information

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The **Doctoral Programme in the Physics and Mathematics of Information: Foundations of Future Information Technologies**

(DP-PMI) aims at providing advanced curricular and research training in the recent developments and fundamental challenges in information sciences and technologies.

The DP-PMI is hosted by [Instituto Superior Técnico](#) (IST), the School of Science and Engineering of the University of Lisbon, in Portugal, and [eight associated research centres](#).

The programme is [funded](#) mainly by a 2.2 MEuro grant from the [Portuguese Science Foundation](#) (FCT). The programme will start in January 2014 and will recruit up to 40 students over the next four years, with the last DP-PMI class expected to graduate in 2021.

The [applications](#) to the **Doctoral Programme in the Physics and Mathematics of Information** are now open!



www.dp-pmi.org

Physics of Information & QuTech Group



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John
Templeton
Foundation



FCT

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EUROPEAN
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Horizon 2020
European Union Funding
for Research & Innovation



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