

## QTSpace hands over a Strategic Report on Quantum Technologies for Space to ESA and the EU: The goal is to bring Quantum Physics to Space

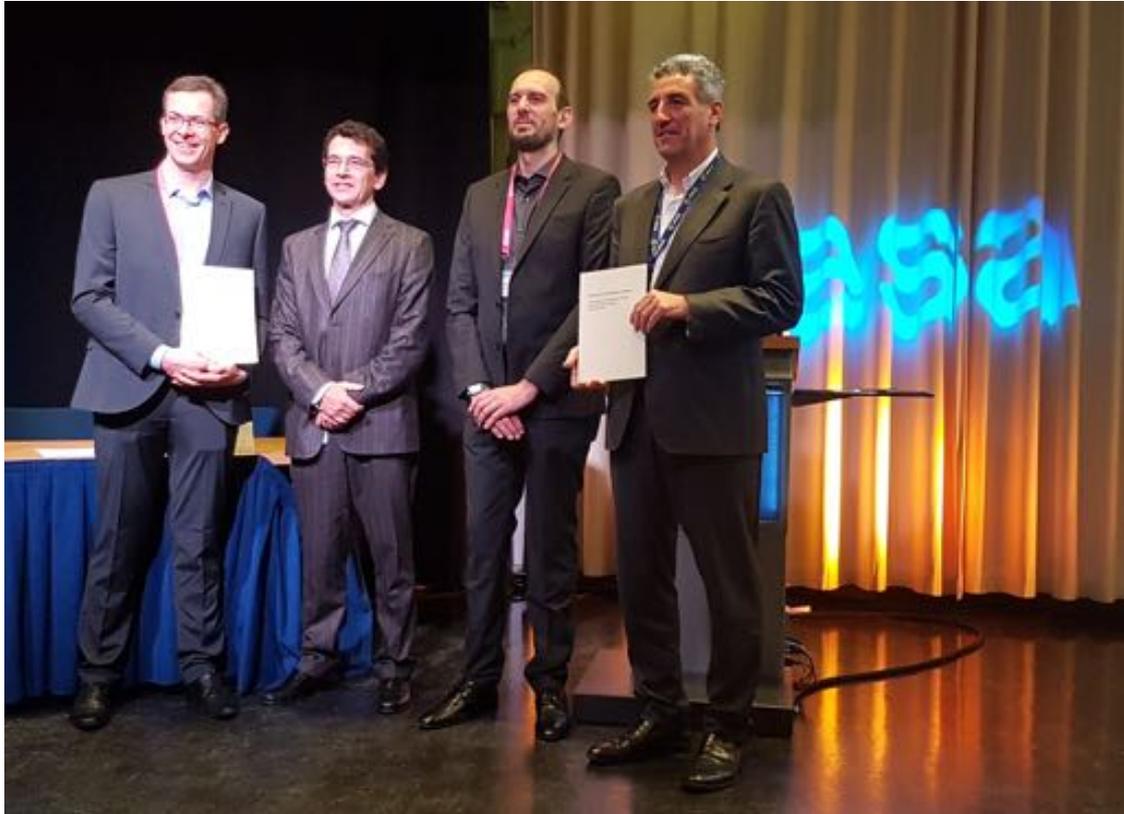


Figure 1. From left to right: Jean-François Buggenhout, José Gavira Izquierdo, Angelo Bassi, and Franco Ongaro. Photo credit: James Bateman

The European Space Agency (ESA) has been developing quantum technologies (QT) for space science and applications for a number of years, both through its technology development programmes—the Technology Research Programme (TRP)<sup>1</sup> and the General Support Technology Programme (GSTP)<sup>2</sup>—, but also using its domain specific technology development programmes—such as, the Earth Observation Envelope Programme (EOEP)<sup>3</sup>, the Science Core Technology Programme (CTP)<sup>4</sup> and the Advanced Research in Telecommunications Systems (ARTES)<sup>5</sup>. More

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<sup>1</sup>[http://www.esa.int/Our\\_Activities/Space\\_Engineering\\_Technology/Shaping\\_the\\_Future/About\\_the\\_Technology\\_Research\\_Programme\\_TRP](http://www.esa.int/Our_Activities/Space_Engineering_Technology/Shaping_the_Future/About_the_Technology_Research_Programme_TRP)

<sup>2</sup>[http://www.esa.int/Our\\_Activities/Space\\_Engineering\\_Technology/Shaping\\_the\\_Future/About\\_the\\_General\\_Support\\_Technology\\_Programme\\_GSTP](http://www.esa.int/Our_Activities/Space_Engineering_Technology/Shaping_the_Future/About_the_General_Support_Technology_Programme_GSTP)

<sup>3</sup>[http://www.esa.int/Our\\_Activities/Space\\_Engineering\\_Technology/Science\\_Core\\_Technology\\_Programme\\_CTP](http://www.esa.int/Our_Activities/Space_Engineering_Technology/Science_Core_Technology_Programme_CTP)

<sup>4</sup>[http://www.esa.int/Our\\_Activities/Space\\_Engineering\\_Technology/About\\_the\\_Earth\\_Observation\\_Envelope\\_Programme\\_EOEP](http://www.esa.int/Our_Activities/Space_Engineering_Technology/About_the_Earth_Observation_Envelope_Programme_EOEP)

<sup>5</sup>[http://www.esa.int/Our\\_Activities/Telecommunications\\_Integrated\\_Applications/ARTES/ARTES\\_programme\\_overview](http://www.esa.int/Our_Activities/Telecommunications_Integrated_Applications/ARTES/ARTES_programme_overview)

recently, the Secure and Laser communication technology (ScyLight)<sup>6</sup>, part of ARTES, was specifically set up to focus on optical and quantum encryption technologies. In addition, a new QKD Sat public-private partnership is presently being developed.

ESA sees great potential for the use of quantum technologies in areas such as: Earth and planetary remote sensing, secure communications, fundamental physics, microgravity research and navigation, amongst others. Furthermore, Interest in QT for space is increasing as technologies are becoming mature for ground applications and the space segment is believed to be an essential component of the global commercialisation effort.

For the second year in a row, the Quantum Technology – Implementations for Space Workshop<sup>7</sup> was held at ESTEC, ESA's Space Research and Technology Centre, in Noordwijk, The Netherlands. The workshop gathered academia, industry, European institutions and other stakeholders in this field.

An important addition to this year's edition was the inclusion of QTSpace in the workshop's Scientific Programme Committee, following calls to increase collaboration with this body during last year's workshop.

QTSpace<sup>8</sup> is a newly established European network on Quantum Technologies in Space, funded by the EU COST (European Cooperation in Science and Technologies). QTSpace is the first network to bring together quantum physics and space research, arguably the two most important achievements of mankind in science and technology over the last century.

The ambitions of QTSpace are twofold: 1) lift our current understanding of nature to a higher level, which necessitate performing quantum experiments in outer space; 2) use the new generation of quantum devices for improving space-related technology.

In the past few months, QTSpace was engaged in the preparation of a Strategic Report on Quantum Technologies for Space. A team of 28 academic and industrial actors have shaped the priorities and strategies for the forthcoming years by identifying four pillars for scientific and technological development: secure communication, time and frequency

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<sup>6</sup>[http://www.esa.int/Our\\_Activities/Telecommunications\\_Integrated\\_Applications/ScyLight](http://www.esa.int/Our_Activities/Telecommunications_Integrated_Applications/ScyLight)

<sup>7</sup><http://old.esaconferencebureau.com/2017-events/17c16>

<sup>8</sup> [www.qtspace.eu](http://www.qtspace.eu)

services, earth sensing and observation, and fundamental physics. All such themes will be boosted by the emerging second generation of quantum technologies.

On 15<sup>th</sup> November 2017, the second day of the [ESA workshop](#), Angelo Bassi, Chair of QTSpace, handed a strategic report on “Quantum Technologies in Space” over to ESA, represented by Franco Ongaro–Director of Technology, Engineering and Quality and Head of ESTEC, and to the EU represented by Jean-François Buggenhout–Deputy Head of Unit, DG CONNECT, European Commission.

The Report can be accessed from the [QTSpace website](#) and is now open to the scientific community for comments and suggestions, which will help preparing a final version of the document.

The Report embodies an important step forward towards enhanced coordination and synergy among the current space-related research activities within Europe. It will help Europe to better stand the fierce competition of USA and China.

Photo credit: James Bateman