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AppQInfo - Applications and Hardware for Photonic Quantum Information Processing

AppQInfo will provide a world class training in photonic Quantum Information Processing (pQIP), and prepare an excellent cohort of Early Stage Researchers (ESRs) to become the future R&D staff of Europe's emerging markets in this area. Quantum Information Processing (QIP) is a key ingredient in Europe's future Quantum Communication Infrastructure; it underpins quantum communications and quantum simulations, the first two pillars of the H2020 Quantum Flagship. QIP will revolutionise information technology, providing higher quality, speed and unconditional security, not possible with classical technologies. AppQInfo focusses on QIP in state-of-the-art integrated photonics, one of five Key Enabling Technologies for European Industry. Integrated photonics permits the creation, manipulation and readout of photonic quantum states in a highly controlled manner, with high speeds and low losses. The broad objectives of AppQInfo are: to create an excellent training of ESRs in the field of pQIP that is both interdisciplinary and intersectoral; to develop innovative, entrepreneurial ESRs with great career prospects; to maximise the exploitation and dissemination of our research; to engage the public through several outreach activities; to consolidate a wide expertise in the field of pQIP; to create a long-lasting collaboration network of top-class research units and industrial entities. Together, our 15 interdisciplinary research projects will work towards feasible long-distance quantum communications from urban-scale networks to satellite-based systems using various data encoding; study quantum photonic circuits towards their quantum transport properties and quantum transforms they implement; exploit these platforms for machine learning applications, such as building all-optical artificial neural networks, and applying them for quantum simulations; develop enabling technologies of sources and detectors of multiphoton quantum states and polaritonic logic gates.

UNIPD Team Leader: Giuseppe Vallone

Department: Department of Information Engineering

Coordinator: Uniwersytet Warszawski (Poland)

Other participants:

Universität Wien (Austria)

Università degli Studi di Padova (Italy)

The Chancellor Masters & Scholars of The University of Oxford (United Kingdom)

Imperial College of Science, Technology and Medicine (United Kingdom)

Université libre de Bruxelles (Belgium)

Sorbonne Université (France)

IBM Research GmbH (Switzerland)

id Quantique SA (Switzerland)

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