QuantaGENOMICS

NEWSLETTER - OCTOBER, 2024

FOURTH QUANTAGENOMICS GENERAL ASSEMBLY AT LISPOLIS, IN LISBON

Group photo - from right to left: José Leal (Ophiomics), Adriano Innocenzi (SU), Ricardo Faleiro (IT), Paula Alonso (ICFO), Juan José Romero (UPM), Diogo Matos (IT), Pascal Lefebvre (SU), Migla Miskinyte (Ophiomics), André Chailloux (INRIA), Armando Pinto (IT), Nelson Muga (IT)

The **fourth in-person QuantaGenomics General Assembly** was held on **20th of June 2024** and took place in **Lisbon**, Portugal, at **LISPOLIS**, and was attended by the majority of the partners (IT, SU, ICFO, INRIA, and UPM). **The event aimed to join teammates and partners to discuss the running tasks and activities**, in addition to **defining the following steps** according to the work plan for each stage. The representatives had the opportunity to share with their colleagues the work status, discuss new ideas, and plan further activities.

ABOUT THE PROJECT

QuantaGenomics is a QuantERA ERA-NET Cofund in Quantum Technologies project with a focus on the development of a quantum-enabled secure multiparty computation service for collaborative genomic medicine.

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PARTICIPATION IN THE INTERNATIONAL CONFERENCE ON TRANSPARENT OPTICAL NETWORKS - ICTON 2024

Two of QuantaGENOMICS' members, **Instituto de Telecomunicações and the Universidad Politécnica de Madrid**, paticipated in the **24th edition of the International Conference on Transparent Optical Networks (ICTON 2024)**, which took place in **Bari**, Italy, from **July 14th - 18th, 2024**.
Some of the project's research results were presented in this workshop.

From left to right: Nelson Muga (IT), Sławomir Sujecki (WUST), Nick Aquina (TUE), Daniel Lawo (TUE), Nuno Silva (IT), Laura Ortiz (UPM)

Daniel Pereira, former researcher at the Quantum Communications Group of the IT and PhD in Electrical Engineering from the UA

BEST PHD THESIS AWARD AOP 2024

Daniel Pereira, former researcher at the Quantum Communications Group of the Institute of Telecommunications (IT) and PhD in Electrical Engineering from the University of Aveiro (UA), was **honored at the sixth edition of the International Conference on Optics and Photonics – AOP 2024**, with **the award for "Best PhD Thesis in Optics and Photonics in Portugal in 2023**".
Daniel's award-winning thesis, **titled "Analysis and Optimization of Continuous Variables Quantum Cryptographic Systems"**, is an **innovative study showcasing the possibility of implementing quantum secure cryptographic systems** using equipment that is already deployed in current fiber optic networks.
This research was conducted as part of the QuantumPrime and Quantagenomics projects as well as under the PhD grant with the reference SFRH/BD/139867/2018, attributed by the Foundation for Science and Technology (FCT).
The work was carried out under the supervision of Professor Armando Nolasco Pinto from the University of Aveiro and researcher at the Instituto de Telecomunicações and of Doctor Nuno Alexandre Peixoto Silva, researcher at the Instituto de Telecomunicações.
Currently, **Daniel is a researcher at the Security and Communication Technologies Group of the Austrian Institute of Technology – AIT**.

CURRENT SCIENTIFIC ACTIVITIES

QuantaGENOMICS has three work packages (WPs) **running**: **WP1 - Project Management, WP5 - Dissemination and Exploitation, and WP4, Integration in a Classical Optical SDN Network**. The two technical WPs, WP2 - Quantum Foundation for SMC and WP3 - Laboratory Validation, were successfully terminated with the accomplishment of the respective deliverables.

WP1 continues to ensure the proper administrative and scientific management of the project, e.g. day-to-day operational administrative and contractual tasks of the project and establishing the interface and interaction with the QuantERA office.

WP5 has ensured the dissemination of the project, including the presentation of project activities, objectives and results at scientific events and national and international conferences, as well as journal publications.

WP4, led by UPM, is the technical WP that is currently active and **aims to demonstrate a genomic medicine service supported by quantum technology**. Activities are currently focused on the integration of the quantum resources and protocols, developed in the first part of the project, in a software defined network. This includes a first phase of remote validation followed by a practical implementation outside the laboratory.

PAPERS IN INTERNATIONAL JOURNALS

- **E. Diamanti, A. B. Grilo, A. Innocenzi, P. Lefebvre, V. Yacoub, Á. Yángüez, "A Practical Protocol for Quantum Oblivious Transfer from One-Way Functions,"** arXiv:2406.09110 , V(2024). Doi: 0.48550/arXiv.2406.09110.
- **Lorenzo Catani, Ricardo Faleiro, Pierre-Emmanuel Emeriau, Shane Mansfield, and Anna Pappa, "Connecting XOR and XOR* games,"** Phys. Rev. A, Vol. 109, pp. 012427, (2024). Doi: 10.1103/PhysRevA.109.012427.
- **Marta I. García-Cid, Dileepsai Bodanapu, Alberto Gatto, Paolo Martelli, Vicente Martín, and Laura Ortiz, "Experimental implementation of a quantum zero-knowledge proof for user authentication,"** Opt. Express, Vol. 32, pp. 15955-15966, (2024). Doi: 10.1364/OE.517754.
- **Sara Mantey, Nuno Silva, Armando N. Pinto, and Nelson J. Muga, "Design and Implementation of a Polarization-encoding System for Quantum Key Distribution,"** Jornal of Optics, Vol. 26, pp. 075704, (2024). Doi: 10.1088/2040-8986/ad535a.
- **Zeinab Rahmani, Armando N. Pinto and Luís Barbosa, "Secure two-party computation via measurement-based quantum computing",** Quantum Inf Process, Vol. 23, pp. 221, (2024). Doi: 10.1007/s11128-024-04433-7.

COMMUNICATIONS IN INTERNATIONAL SCIENTIFIC MEETINGS

- **N. A. Silva, M. Almeida, N. J. Muga, A. N. Pinto, "Impact of Limited Classical Channel Bandwidth on the Secret Key Rate of a CV-QKD System,"** International Conf. on Transparent Networks – ICTON, Bari, Italy, 2024.
- **N. J. Muga, S. T. Mantey, N. A. Silva, M. Fernandes, G. Fernandes, F. P. Guiomar, P. Monteiro, A. N. Pinto, "Coexistence of Classical and Quantum Signals in Hybrid Fiber and Free-Space Optics Links for QKD Integration,"** International Conf. on Transparent Networks – ICTON, Bari, Italy, 2024.
- **S. T. Mantey, M. Fernandes, G. Fernandes, N. A. Silva, F. P. Guiomar, P. Monteiro, A. N. Pinto, N. J. Muga, "Impact of Fast Power Fluctuations Caused by Atmospheric Turbulence on Polarization Measurements,"** International Conf. on Applications of Optics and Photonics – AOP, Aveiro Portugal, 2024.
- **Maurício J. Ferreira, Nuno A. Silva, Armando N. Pinto, Nelson J. Muga, "Searching for Bias in Commercial Quantum Random Number Generators,"** International Conf. on Applications of Optics and Photonics – AOP, Aveiro Portugal, 2024.

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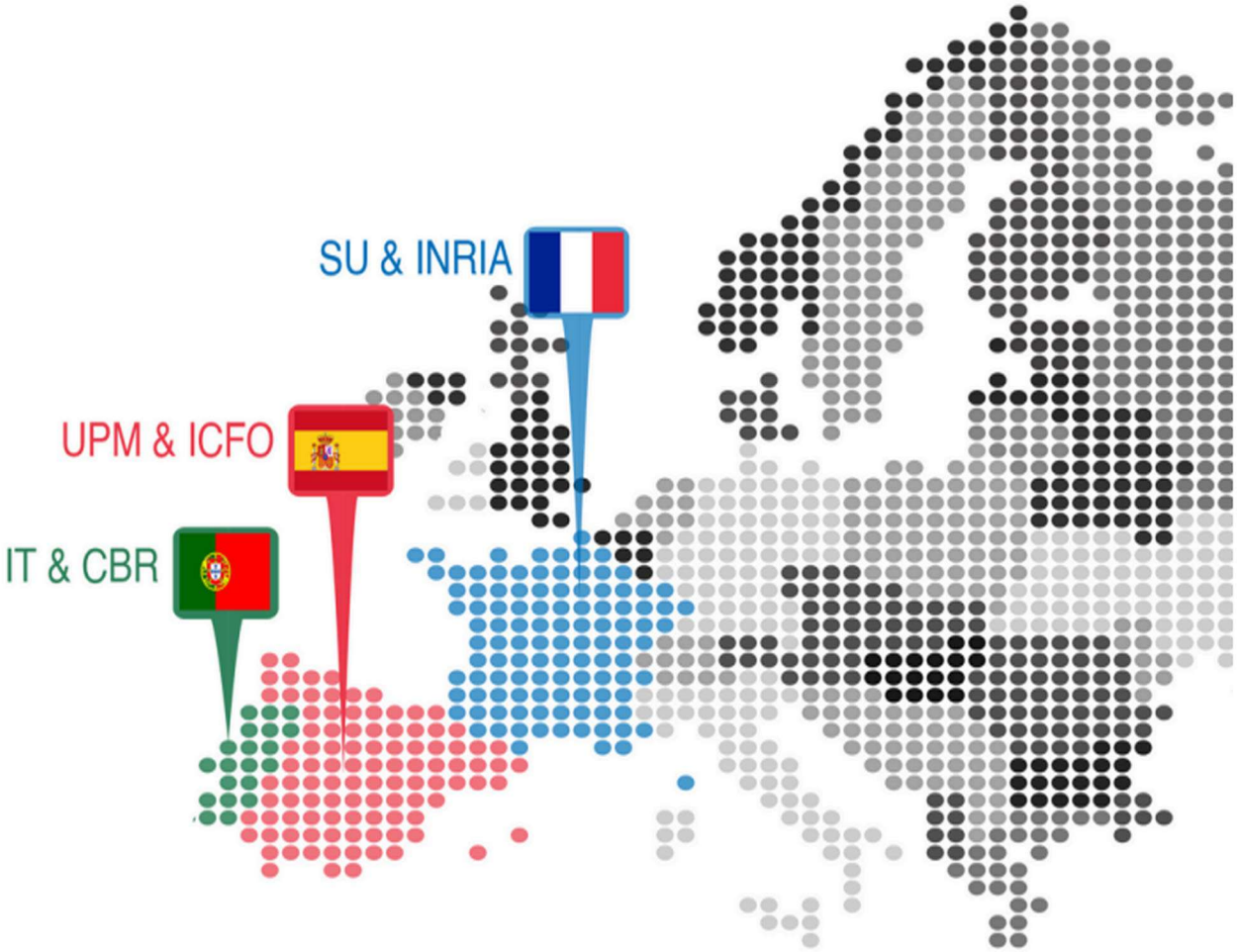

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