

# QuantaGENOMICS

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6TH EDITION

## THE 5TH QUANTAGENOMICS GENERAL ASSEMBLY AT INRIA, IN PARIS



*Group photo: Armando Nolasco Pinto (Instituto de Telecomunicações), André Chailloux (INRIA), Adriano Innocenzi (Sorbonne Université), Paula Alonso Blanco (ICFO), Juanjo Romero (Universidad Politécnica de Madrid), Laura Ortiz (Universidad Politécnica de Madrid), Diogo Matos (Instituto de Telecomunicações).*

The fifth in-person **QuantaGenomics General Assembly** was held on the 3rd of December 2024, and took place in Paris, France, at **INRIA**, 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.

#### In this issue:

The 5th QuantaGenomics General Assembly at INRIA, in Paris; Project Extension; Participation in Conference; Current Scientific Activities and Publications.

# PROJECT EXTENTION

At the 5th General Assembly, the consortium decided to request an **extension of the project QuantaGENOMICS**. The extension request was approved by the **QuanterTeam** and the three national funding agencies (**FCT, ANRS** and **AEI**), and the new end date for the project is now 30 April 2026.

Despite the promising results already obtained, as reported in the deliverables D3.1, D3.2, and D3.3, and D4.1.1 and D4.1.2, the requested extension of the project will allow the consortium to **consolidate results**, broaden its scope, and **improve the systems' performance**.

In particular, the following **aspects will benefit** from the extension:

- Improvement of the **system performance** in terms of the oblivious keys generation, as it is expected that the different setups may increase their maturity;
- Extension of the **security analysis**, now considering the system integration into an SDN scenario;
- **Maturation of the integration** into the Madrid quantum network, whose upgrades and extension suffered some delays but are now running smoothly.

## PARTICIPATION IN CONFERENCE



The UPM team participated in the **International Conference on Quantum Communications, Networking, and Computing**, which took place in Nara, Japan, between March 31 to April 2, 2025). Among others, the team presented the work carried out in the context of the QuantaGenomics project. Juanjo Romero was the responsible for the presentation "Enabling oblivious key on a quantum network in QuantaGENOMICS project".

## CURRENT SCIENTIFIC ACTIVITIES

The global objective of QuantaGENOMICS is to explore quantum effects and concepts from quantum science and translate them to the development of radically new technological applications in quantum SMC. This will foster the development of ground-breaking genomic-based clinical services, in which privacy is assured by quantum technologies.

During the last semester of the project, the QuantaGENOMICS research team focused its efforts on the experimental implementation and validation of the theoretical protocols developed in the first stage of the project, as well as the integration of quantum resources (e.g., oblivious keys) into the upper layers (e.g., key management systems) of the network and applications.

WP 2 - Quantum Foundations for SMC was closed in M21. On the other hand, WP 3 - Laboratory Validation, was closed at M27, with three deliverables successfully completed at M24 (D3.1 - Experimental validation of a novel DV-based quantum oblivious transfer protocol for secure multiparty computation and D3.2 - Report of the laboratory proof of principle validation addressing the CV approach ) and M27 (D3.3 - Report of the laboratory proof of principle validation addressing entanglement ). WP 4 - Integration in a classical optical SDN network started its activities in M19, with Task 4.1., and all three tasks are currently in progress.

At the non-technical level, the work was carried out at WP1, dedicated to the administrative part, and WP5, dedicated to the dissemination of the results.

# PUBLICATIONS

## Papers in international journals:

- Ricardo Faleiro, Manuel Goulão, Leonardo Novo, Emmanuel Cruzeiro, "1-Shot Oblivious Transfer and 2-Party Computation from Noisy Quantum Storage," arXiv:2410.08367, (2024). Doi: 0.48550/arXiv.2410.08367
- H. Costa, A. N. Pinto, N. J. Muga, Optimization of Voltage Requirements in Electro-Optic Polarization Controllers for High-Speed QKD Systems, Photonics, Vol. 12, No. 3, pp. 267 - 267, March, 2025.

## Communications in international scientific meetings:

- Rahmani, Z., Pinto, A.N., Barbosa, L.S. (2025). Private Computation of Boolean Functions Using Single Qubits. In: Wyrzykowski, R., Dongarra, J., Deelman, E., Karczewski, K. (eds) Parallel Processing and Applied Mathematics. PPAM 2024.

Lecture Notes in Computer Science, vol 15580. Springer, Cham. [https://doi.org/10.1007/978-3-031-85700-3\\_22](https://doi.org/10.1007/978-3-031-85700-3_22)

- Romero, J. J., Vicente, R. J., Brito, J. P., Martin, V., & Ortiz, L. (2025, March 31). Enabling oblivious key on a quantum network in QuantaGENOMICS project. 2025 International Conference on Quantum Communications, Networking, and Computing (QCNC), 269-273. Presented at the 2025 International Conference on Quantum Communications, Networking, and Computing (QCNC), Nara, Japan. doi:10.1109/qcnc64685.2025.00050
- Hugo Filipe Costa, J. G. Prata, Armando N. Pinto, Nelson J. Muga (2025). Design of high-voltage electronic driver for polarization encoding quantum transmitters, *International Conference of Transparent Optical Network (ICTON)*, Barcelona, Spain.

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