HellasQCI Winter School Assessment Report

Assessment Report

Event: HellasQCI Winter School – Training Workshop
Dates: 26–28 November 2025
Venues: Aristotle University of Thessaloniki, WinPhos Lab, KEDEA
Framework: HellasQCI Project – National Quantum Communication Infrastructure for Greece
Coordinator: Dr. Ilias Papastamatiou, Senior Project Manager, GRNET

Overview

The **HellasQCI Winter School** – Training Workshop, held on 26–28 November 2025, marked a significant milestone in the training activities delivered by the HellasQCI consortium as part of Greece's national quantum communication initiative. Organised under the International Year of Quantum Science and Technology (IYQ), and held under the auspices of the Ministry of Digital Governance and Artificial Intelligence, the workshop aimed at training the next generation of engineers in quantum telecommunications and advancing cybersecurity capabilities at the national and European level. HellasQCI, Greece's national quantum communication infrastructure deployed within the wider EuroQCI initiative, is co-funded by the European Union under the Digital Europe Programme (Grant Agreement No. 101091504).

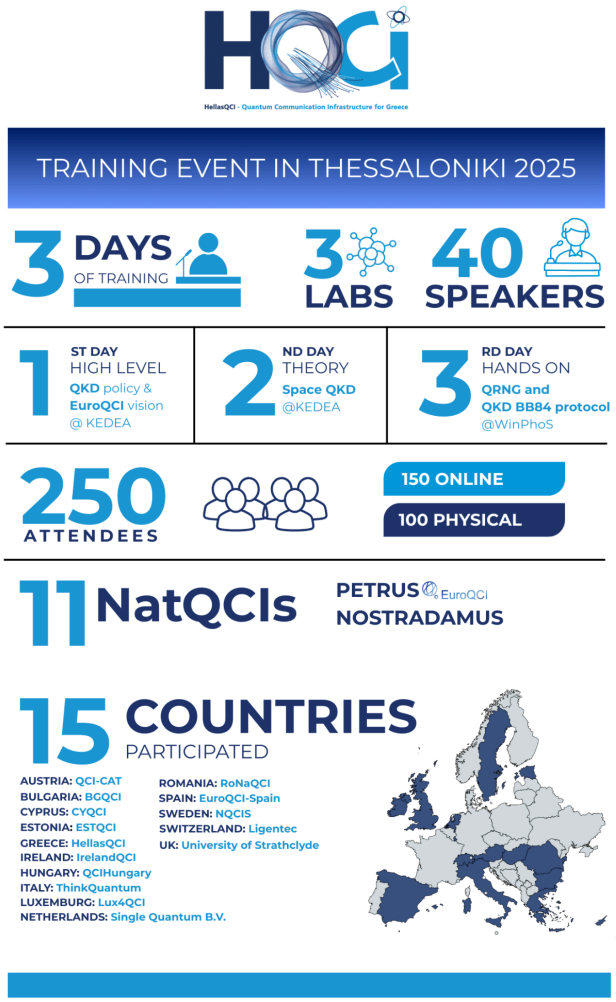
The Winter School represents a key step in strengthening Europe's quantum-secure ecosystem through a high-impact programme tailored to three main stakeholder groups: academic and research staff, digital security experts, and end-users from national security authorities and critical infrastructure operators. More than 250 students, researchers, and

professionals were trained in Quantum Key Distribution (QKD), quantum network architectures, and quantum-secured applications, while 40 international speakers from 15 countries contributed to fostering knowledge exchange and cross-border alignment.

Beyond skills development, the programme supports Greece's readiness for the upcoming EuroQCI CEF Phase 2 deployments—most notably the SEEWQCI and TransEuroQGS projects starting in January 2026—and reinforces the country's role as a regional hub for Southeast European quantum infrastructure. By engaging industry stakeholders and endorsing commercially viable, quantum-ready cybersecurity solutions, the Winter School strengthens the long-term sustainability and interoperability of HellasQCI within the broader European quantum communications landscape.

Watch the **video** with the Highlights here

Event Overview & Execution



The HellasQCI Training Event in Thessaloniki (2025) was successfully implemented as a three-day, intensive capacity-building programme combining policy-level discussions, advanced technical theory, and hands-on practical training in Quantum Key Distribution (QKD).

The event was organised under the framework of the HellasQCI project, under the auspices of the Ministry of Digital Governance and AI, and aligned with the objectives of the European Quantum Communication Infrastructure (EuroQCI).

The training programme spanned three days, covering three complementary thematic pillars: (i) high-level QKD policy and the EuroQCI vision, (ii) theoretical foundations and technologies for space-based QKD, and (iii) hands-on training on QRNGs and QKD protocols, including BB84.

A total of three dedicated laboratory sessions were delivered, ensuring strong practical engagement alongside theoretical learning.

The event brought together 40 expert speakers from academia, research organisations, industry, and national authorities, representing 11 National Quantum Communication Infrastructures (NatQCIs) and key European initiatives, including PETRUS and NOSTRADAMUS. Participation was broad and inclusive, with approximately 250 attendees, combining 150 online participants and 100 physical attendees, enabling both wide outreach and in-depth on-site interaction.

In total, 15 countries were represented, reflecting the strong pan-European dimension of the event and its alignment with EuroQCI objectives. The training was executed through a hybrid format, leveraging modern conferencing infrastructure for remote access while maintaining high-quality in-person sessions, laboratories, and demonstrations. This approach ensured effective knowledge transfer, active participation, and meaningful networking across national and disciplinary boundaries.

Overall, the event was executed in a structured, efficient, and impactful manner, reinforcing HellasQCI's role as a national and European hub for quantum communications training and contributing directly to workforce development, interoperability, and ecosystem building within the EuroQCI framework.

Thematic Content

Day 1 – High-Level QKD Policy and EuroQCI Vision (26 November 2025, KEDEA)

The first day of the HellasQCI Winter School focused on the strategic, policy, and ecosystem dimensions of Quantum Key Distribution (QKD) and the EuroQCI initiative. The training opened with welcome remarks from representatives of the Ministry of Digital Governance and AI (MinDigital), Aristotle University of Thessaloniki (AUTH), GRNET, KETYAK, and the Hellenic Space Center (HSC), highlighting the national importance of quantum-secure communications for public administration, national security, research, and space applications. An overview of the three-day programme was provided by AUTH, followed by a keynote lecture from the University of Strathclyde, setting the scientific and technological context for quantum communications in Europe, and a presentation by NKUA on HellasQCI's participation in flagship EuroQCI demonstrations (QCI Days 2025 and ECOC 2025).

The programme continued with an overview of the PETRUS and NOSTRADAMUS projects, presented by Deutsche Telekom, illustrating how large-scale European initiatives contribute to interoperability, validation, and industrialisation of QKD technologies. A dedicated panel on National Quantum Communication Infrastructures (NatQCIs) brought together representatives from **HellasQCI**

(GRNET), **Lux4QCI** (University of Luxembourg – SnT), **CYQCI** (Cyprus University of Technology), **BGQCI** (Teleconsult EOOD, Bulgaria), and **IrelandQCI** (Walton Institute, SETU), providing a comparative overview of national deployment strategies and cross-border collaboration. In the afternoon, a second NatQCI panel included contributions from **QCI-CAT** from Austria (AIT), **EuroQCI Spain** (ICFO), **EstQCI** from Estonia (RIKS), **NQCIS** from Sweden (Stockholm University), **QCIHungary** (KIFÜ) and **RoNaQCI** from Romania (University Politehnica of Bucharest), underlining the pan-European dimension of EuroQCI.

The day concluded with an industrial QKD session featuring European technology providers and integrators, including ThinkQuantum, Zero Third, Nokia, Single Quantum, QRBIT, and QUBITECH, offering insights into commercially available QKD systems, components, and deployment challenges, followed by a networking reception.

Day 2 – Theory for Space QKD and Optical Ground Stations (27 November 2025, KEDEA)

The second day was dedicated to the theoretical and technological foundations of space-based QKD and optical communications. The programme began with an introduction to quantum information theory by AUTH, followed by sessions on space-based QKD architectures and satellite QKD systems delivered by QRBIT and the Photon and Communication Research Laboratory (PCRL). A comprehensive tutorial on satellite QKD using the QuantLink platform provided participants with an in-depth understanding of end-to-end space quantum links.

Subsequent sessions focused on enabling technologies for space quantum communications, including superconducting nanowire single-photon detectors (SNSPDs) by Single Quantum, photonic integrated circuits (PICs) by Ligentec, optical communication technologies through HellasSat, and the GreekObs2OGS initiative presented by Raymetrics. Industrial and space-sector contributions continued with presentations on miniaturised VCSEL and PIC transceivers for inter-satellite optical links by LEO Space, as well as the PeakSat optical CubeSat mission by the AUTH CubeSat Team.

The afternoon sessions highlighted Greece's Optical Ground Stations (OGSs), with detailed presentations of Holomontas (AUTH), Helmos (National Observatory of Athens), and Skinakas (FORTH / University of Crete), demonstrating their role within HellasQCI and the broader EuroQCI space segment. The day concluded with sessions on quantum random number generators (QRNGs) for space QKD, hands-on experiment theory, and a practical demonstration of the DV-QKD BB84 protocol and a two-bit quantum computer by NTUA and QGreece.

Live QKD Demonstration (26-27 November 2025, KEDEA)

During the first two days of the event, NKUA operated a live Quantum Key Distribution demonstration aimed at participants who were not already familiar with QKD concepts. The demo featured two QKD links arranged in a relay configuration, forming three interconnected QKD nodes. At each node, a FortiGate firewall consumed QKD-generated keys to establish IPsec VPN tunnels, enabling a three-way, quantum-secure videoconference. This setup allowed attendees to directly observe the operation of a QKD-enabled network and to engage with the NKUA team for detailed explanations of both the underlying principles and the practical integration of QKD with standard network security technologies.

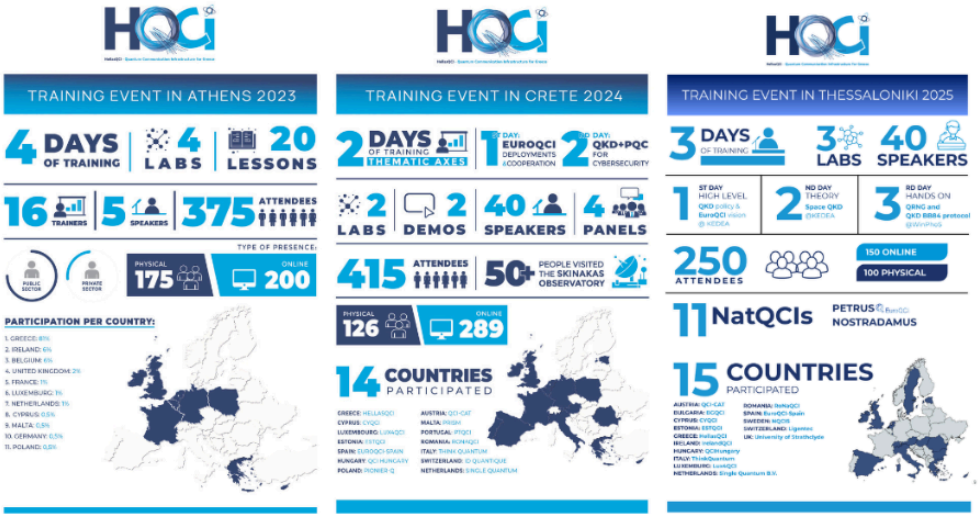
Day 3 – Hands-On QKD Training and Demonstrations (28 November 2025, KEDEK & NOESIS)

The third day focused on applied, hands-on training, allowing participants to directly engage with QKD technologies and operational concepts. Structured laboratory sessions on the building blocks of QKD were conducted in three consecutive modules, guiding participants through practical aspects of QKD system operation, photon-based QKD protocols, and experimental setups. These sessions were designed to reinforce theoretical knowledge acquired during the previous days and to develop operational competence in quantum-secured communications.

The training concluded with a live satellite tracking demonstration at NOESIS, linking the hands-on QKD exercises with real-world space communication scenarios and underlining the importance of integrating terrestrial and space-based quantum infrastructures within HellasQCI and EuroQCI.

Cumulative Training Impact (2023–2025)

- **Total Attendees:** 1,040+ professionals trained
- **Total Lessons:** 75 training modules delivered
- **Total Laboratory Sessions:** 9 hands-on labs conducted
- **International Engagement:** Training spanning 3 Greek cities and 15+ countries
- **Recurring Partners:** PETRUS CSA, Nostradamus, and 20+ NatQCI projects demonstrating sustained EuroQCI ecosystem engagement
- **Training Platform Users**: 124
- **HellasQCI Community Registry**: 37 Members
- Infographics of Training Events - **Athens 2023** - **Crete 2024** - **Thessaloniki 2025**



Useful Links & References

Official Project Websites

- **HellasQCI Project Portal:** https://hellasqci.eu/
- **HellasQCI Training Platform:** https://training.hellasqci.eu/
- **HellasQCI Winter School Agenda**: https://hellasqci.eu/hellasqci-winter-school-2025/
- **GRNET - National Infrastructures for Research and Technology:** https://www.grnet.gr/

EuroQCI Framework & Documentation

- **EuroQCI Initiative:** https://petrus-euroqci.eu/
- **Digital Europe Programme** https://digital-strategy.ec.europa.eu/

Winter School Video & Media

- **Event** **Highlights** [Available on **HellasQCI YouTube** Account **here**]
- **Diavlos** Webstream **On demand here**
- **Photo and Video Gallery**