



Spain: State of Quantum – August 2025

*Strategic Simplicity Meets Photonic
Prowess*

Executive Summary

Spain's quantum strategy is one of deliberate alignment and deep scientific roots. With a quiet confidence, Spain is carving out influence in photonics, simulation, and quantum-safe communication. Anchored by institutions like ICFO and backed by national integration into EuroQCI and Horizon Europe, Spain's approach is pan-European at heart, but distinctly Iberian in its elegance. In 2025, Spain's photonic technologies and hybrid computing architectures positioned it as a stabilizing force and trusted collaborator in Europe's quantum landscape.



National Strategy & Infrastructure

While Spain lacks a sweeping national quantum blueprint like Germany or France, it compensates with strong institutional coordination and EU-aligned priorities.

Key initiatives include:

- **ICFO (Institute of Photonic Sciences)** in Barcelona, one of the world's leading quantum optics centers, particularly in QKD and photonic entanglement.
- **Quantum Spain**, a government-supported initiative launched in 2021, has built out a national network of quantum nodes and algorithms research groups.
- **BSC-CNS (Barcelona Supercomputing Center)** is piloting hybrid quantum-classical systems, with open access to researchers across Spain.
- Spain is an active participant in EuroQCI, and in 2025, rolled out pilot QKD links in Madrid and Valencia.

Public / Private Collaboration & Academic Firepower



Spain's academic scene is both productive and well-networked, with key institutions leading in quantum theory, simulation, and experimental optics:

University of Barcelona, Autonomous University of Madrid, and ICFO drive most of the high-impact publications and EU project participation.

Qilimanjaro Quantum Tech, a Barcelona-based startup, is gaining traction for its analog quantum computing approach, and secured EU funding in 2024.

Indra and **Telefónica** have partnered on secure communication pilots and encryption infrastructure.

Spain's National Institute of Aerospace Technology (INTA) is exploring quantum-enhanced navigation.

International Relationships & Funding

Spain is a model of strategic alignment with EU-wide programs. In 2025:

- Spain secured over €70 million in Horizon Europe and Digital Europe funding for quantum-related projects.
- Bilateral partnerships are active with **France, Italy, and Portugal**, including joint photonics and sensing platforms.
- Spain is helping prototype Mediterranean integration routes for EuroQCI infrastructure, linking Iberian systems to France and Italy.



G7 Summit & Strategic Alignment

While not a G7 member, Spain actively engaged in quantum working groups during the 2025 Puglia Summit. Its contributions centered on:

- Quantum-safe communications across southern Europe.
- Post-quantum cryptography transitions for national infrastructure.
- Interoperability guidelines for Mediterranean data exchange.

Spain's emphasis was subtle but sharp: the quiet security of shared standards over splashy declarations.



Opportunities and Challenges

Opportunities

- Strength in **quantum optics** and **hybrid architectures** makes Spain a natural collaborator in quantum networking.
- Its Mediterranean position enables it to be a **quantum data and security gateway**.
- With growing investment in **sustainable tech**, Spain could link quantum sensing to energy and climate monitoring.



Challenges

- Lack of a unified national quantum agency can slow momentum.
- Talent retention is fragile; top researchers still migrate to central Europe.
- Domestic venture capital for quantum startups remains limited.



Outlook for 2025 & Beyond

Spain's momentum is building, though its cadence is cautious. A national strategy is rumored for release in 2026, likely focused on applied use cases and SME inclusion. The QKD infrastructure laid in 2024–25 may evolve into a full Iberian secure network by 2027.

Spain's quantum story is less about headline dominance, more about strategic participation—measured, international, and deeply photonic.



Final Reflection

Spain's quantum voice is not the loudest, but it resonates clearly in European corridors. Its strength lies in integration: of theory and hardware, of national goals and European values, of science and diplomacy. As of August 2025, Spain is neither outlier nor follower—it's a signal amplifier in Europe's quantum chorus.

