IBERGRID 2026

Q-STARS

Quantum Solutions and Technologies for Advanced and Resilient Sectors

Bringing quantum AI and optimisation to health, energy and industry

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Quantum computing promises a lot, but two barriers still slow its real-world adoption

Technological barrier

- Noisy, small-scale (NISQ) hardware
- Algorithms not yet mature or scalable

Organisational barrier

- Quantum experts lack sector knowledge
- Sector experts are new to quantum
- Few use cases identified

Both must be addressed together to move from promise to impact.

Q-STARS bridges that gap by co-designing quantum AI and optimisation with sector experts

Can quantum machine learning and quantum optimisation, co-designed with domain experts, solve complex problems in health, energy and industry?

1 Co-design

Quantum and sector experts work on the same problems

2 Hybrid methods

Quantum and classical computing combined

3 Real use cases

Methods validated on real-world data

A €4M, three-year public–private effort to take quantum applications from TRL 2 to TRL 4

€3.99M

total budget

12

partners from industry and research

2025–2028

October 2025 to October 2028

TRL 2 → 4

from concept to lab validation

Funding: CDTI, INNTERCONECTA-STEP 2025 call (Quantum Technologies), co-funded by the European Union through the ERDF.

Six companies and six research organisations combine quantum expertise with sector know-how

Companies

FSAS project lead · quantum algorithms

ARC quantum neural networks

Bahía Software health · QML · distributed QC

PRILUX industrial processes

Quinto Armónico energy markets and grids

Tecnologías Plexus energy, water and health

Research organisations

Supercomputing centres
CESGA · COMPUTAEX

Technology centres
CARTIF · EURECAT · ITECAM

Biomedical research
FINIBIC (INIBIC, A Coruña)

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Two research lines on quantum methods feed a third line that tackles real industrial problems

WP0 Coordination aligns methods, metrics and use cases across the project

WP1 Quantum Machine Learning
Quantum neural networks for time series, anomaly detection and generative AI

WP2 Quantum optimisation
QUBO models, QAOA and hybrid quantum–classical decomposition

WP3 Real-world problems

Methods applied to sector use cases with real data

Requirements and results flow back to WP1 and WP2

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Real problems from three critical sectors anchor the research

Health

- Predicting multidrug-resistant infections in hospitals
- Synthetic lung-cancer images for early detection

Energy

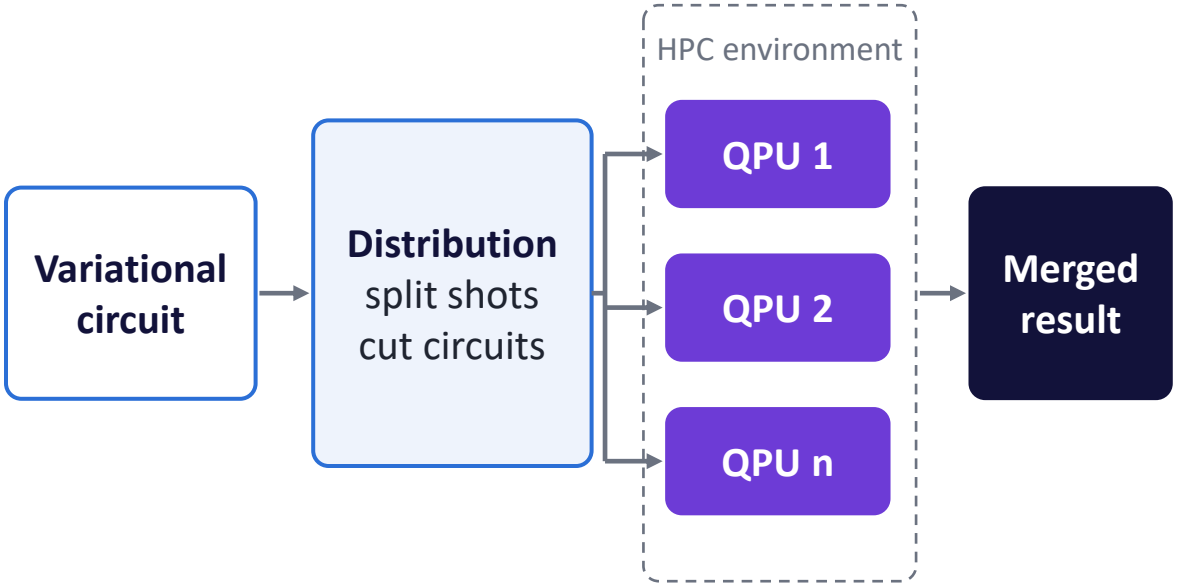
- Bids in secondary-regulation electricity markets
- Battery-based virtual power plants
- Electricity and water resource optimisation

Industry

- Production planning and scheduling
- Predicting profitability of production orders

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Distributing variational circuits across several QPUs brings quantum workloads into HPC

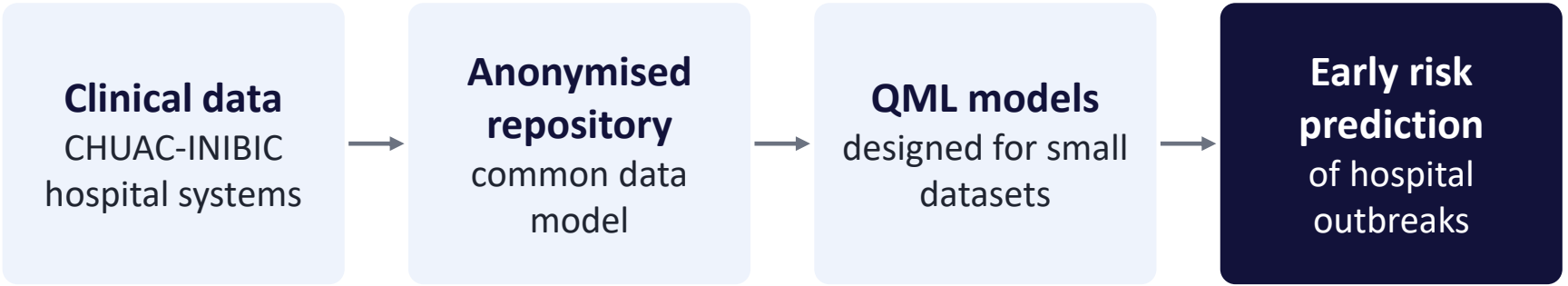


Why it matters

- One NISQ device limits circuit size and throughput
- Several QPUs work as one inside HPC workflows
- Developed with CESGA (Qmio, Finisterrae III)

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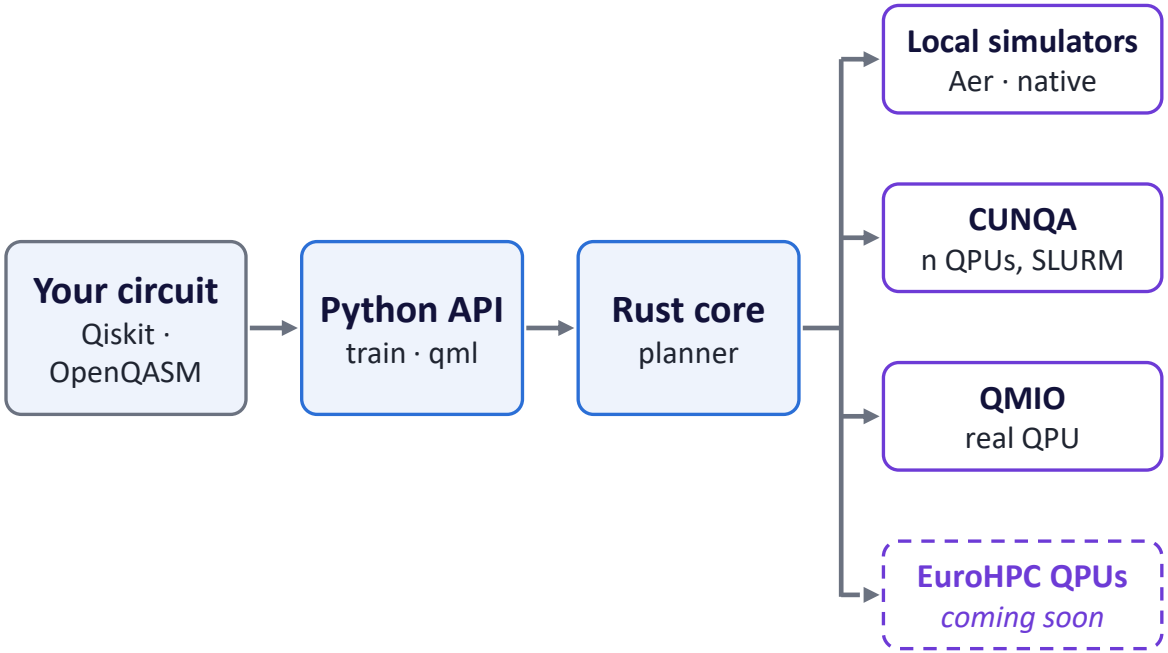
Bahía leads the health use case: predicting multidrug-resistant infections with quantum ML



Why quantum? Few cases, high impact: small clinical datasets are where QML may add value.

Bahía also leads the distributed execution of variational circuits, with CESGA.

Polypus: open-source European software to run quantum circuits across many QPUs



Polypus

- **Open source · EUPL-1.2**
- Rust core, Python API
- One-line target switch
- **Contributions welcome**

```
pip install
polypus-quantum
```

Open issues, propose features, add algorithms

github.com/Bahia-Software/polypus

Source: Polypus README (2026)

Conclusions

1. Q-STARS brings quantum and sector experts together on real problems in health, energy and industry.

2. Quantum computing becomes practical inside HPC: distributed execution across several QPUs.

3. Open, European tools matter: try Polypus and help us improve it.

github.com/Bahia-Software/polypus

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