



## **Master in Photonics – “PHOTONICS BCN” Master ERASMUS Mundus “EuroPhotonics”**

### **MASTER THESIS PROPOSAL**

**Full time from April 2026** (it can start part time from February 2026)  
**Presentation date to be chosen: end of July or beginning of September 2026**

**Note:** The main Master Thesis supervisor has to be a professor of the Master in Photonics program. One co-supervisor (internal or external) can be defined. Main Supervisor is responsible for the subject of the proposal and has to give continuous support to the student (research development, Report writing and presentation preparation). For external proposals a co-supervisor from the Master program and a collaboration agreement with UPC are needed. You can find all information about the Master Thesis process in [our webpage](#).

**Laboratory: Quantum Computing Technology group**

**Institution: IFAE**

**City, Country: Cerdanyola del Vallès, Spain**

**Title of the master thesis: Fluxonium qubits for quantum annealing**

**Name and affiliation of the master thesis supervisor: Pol Forn-Díaz, IFAE**

**Name and affiliation of the co-supervisor (if any): Guillermo del Riego, IFAE**

(for external proposals a co-supervisor chose among the Master Program professors and a collaboration agreement with UPC is needed)

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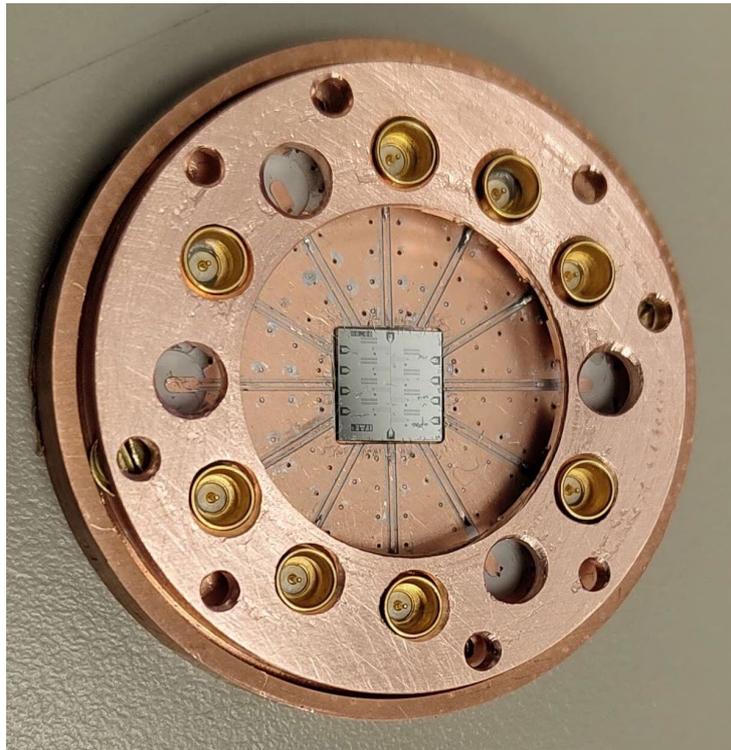
**Keywords: Quantum Computing, Quantum Annealing, superconducting qubits, flux qubits, fluxonium qubits**

#### **1. Summary of the subject (maximum 1 page):**

**Fluxonium qubits are currently the most coherent of all superconducting qubits, having shown coherence times in excess of a millisecond. These type of flux qubits contain a loop with a large inductor which can either consist of an array of Josephson junctions or a disordered superconductor. Its low persistent current provides a very strong protection from flux noise, while the sub-GHz frequency guarantees a low sensitivity to dielectric noise.**

## 2. Objectives (maximum 1 page):

These qubits have so far been mostly envisioned for gate-based quantum computing. In this project, the first generation of fluxonium-like qubits will be produced to demonstrate its capabilities in analog quantum computing applications, more in particular in quantum annealing. The project will focus on the design of a novel flip-chip generation of qubit devices in which the control and readout of the qubit will be performed through a separate chip placed face-to-face with the chip holding the qubit. In this architecture, the qubit should preserve its long coherence properties while at the same time be usable for quantum annealing applications in larger-scale devices.



### Additional information (if needed):

\* Required skills: quantum physics

\* Miscellaneous: available monthly stipend to cover travel and personal costs, funded by the [Catalonia Quantum Academy](https://qct.ifae.es/).

Research group: <https://qct.ifae.es/>