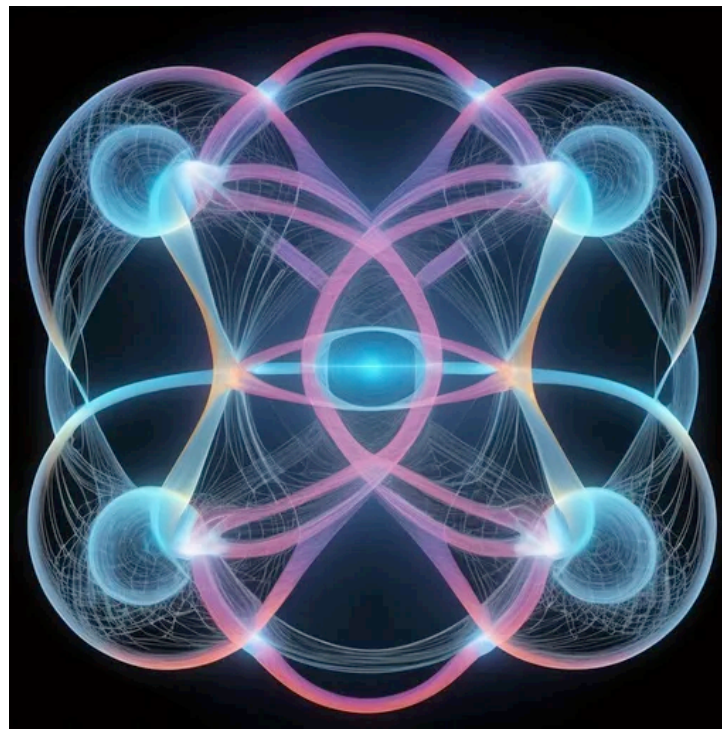
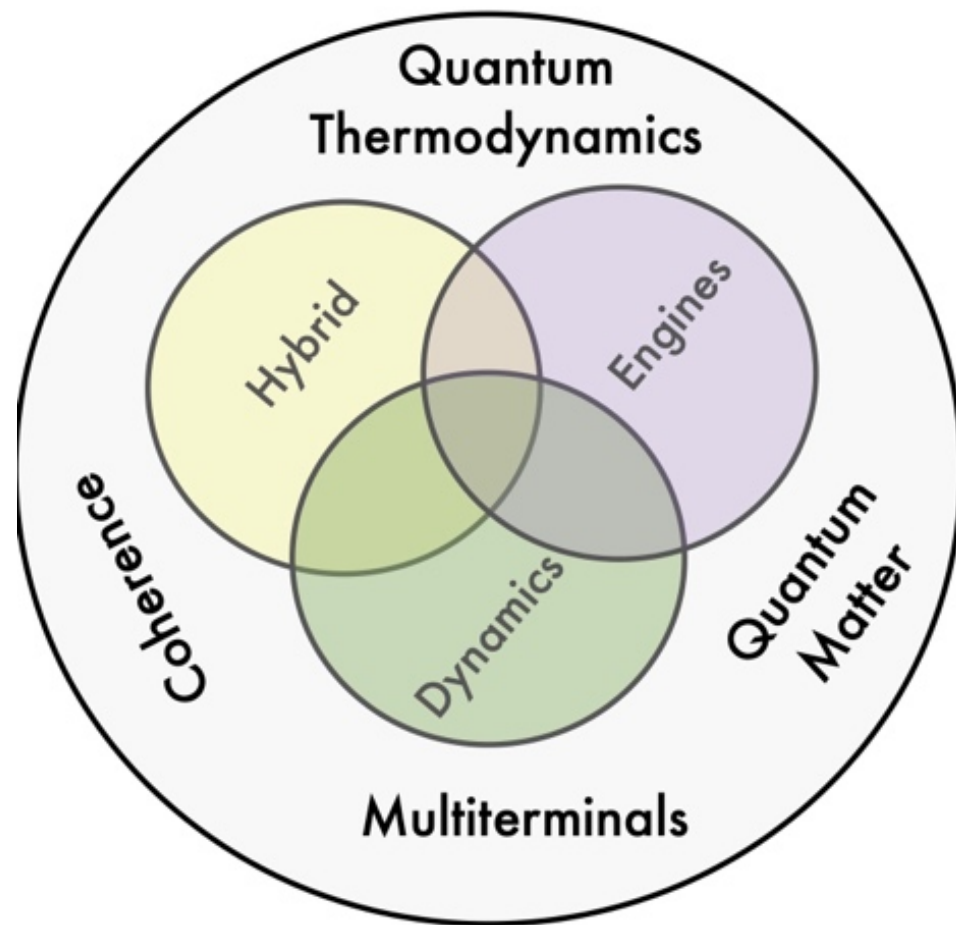


PROYECTOS DE GENERACIÓN DE CONOCIMIENTO 2023
MODALIDAD: INVESTIGACIÓN NO ORIENTADA TIPO B
PID2023-151975NB-I00



Surfing Multiterminal Quantum Thermodynamics and Topology (SuMQuTT)





WORK PACKAGE I

Hybrid devices: superconducting and topological matter

WORK PACKAGE II

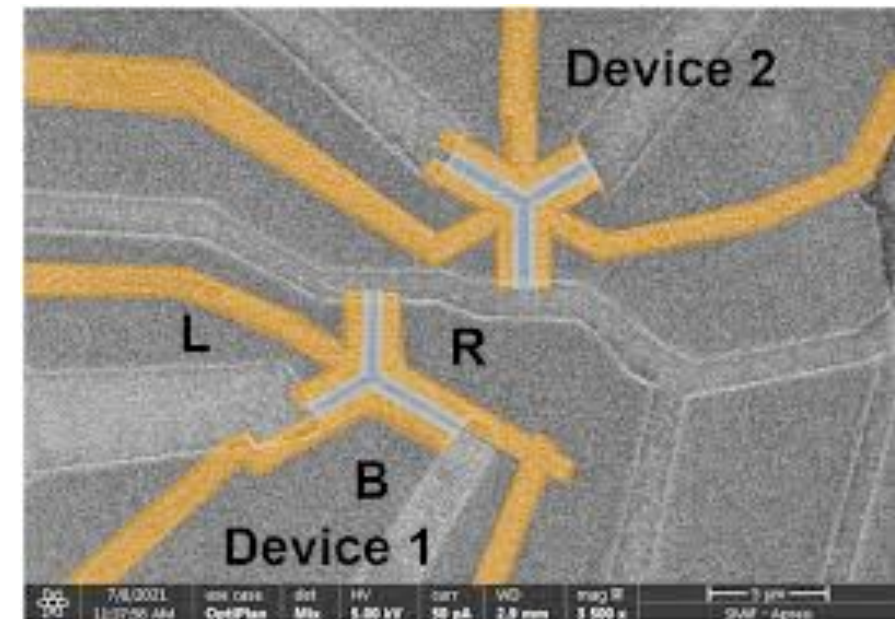
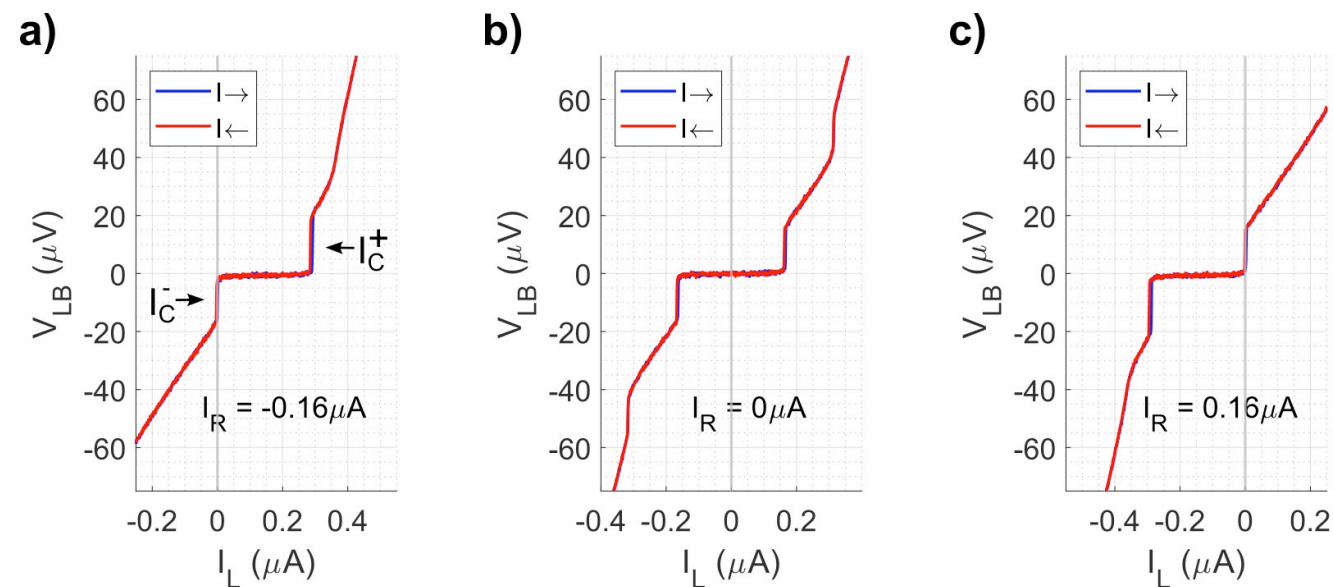
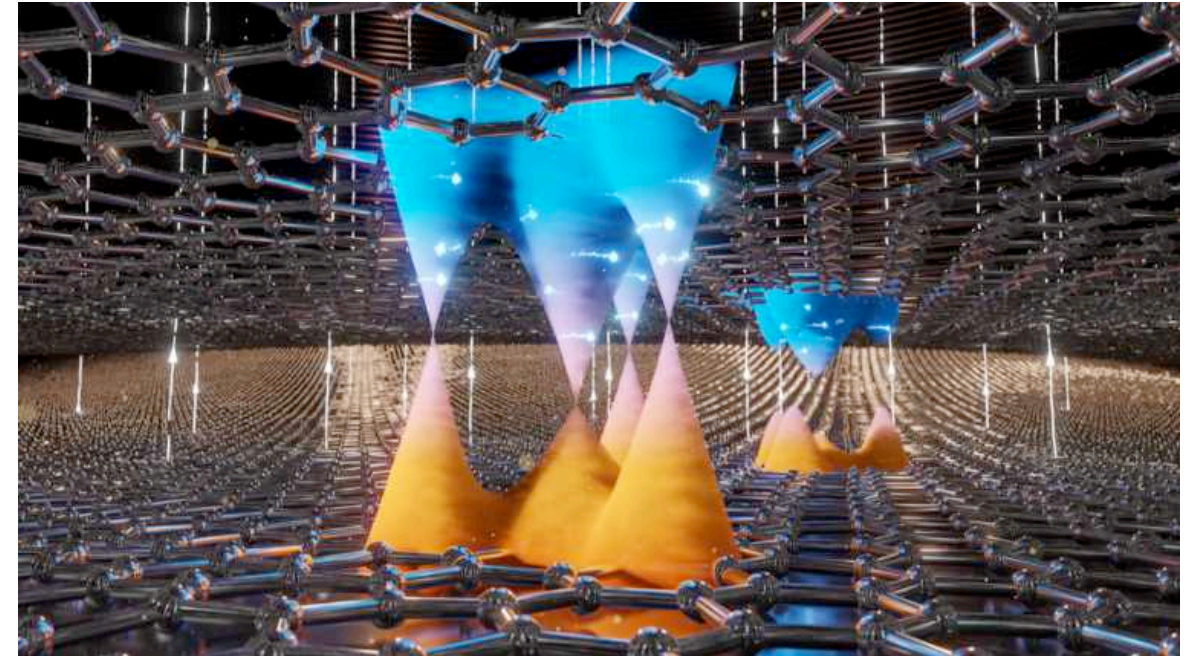
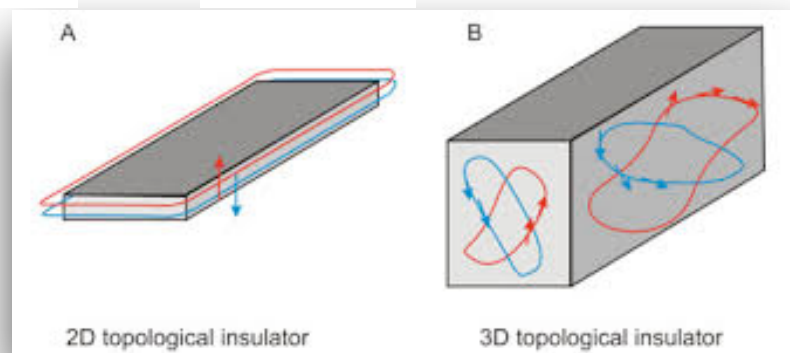
Quantum thermodynamics: Coherence, and Entanglement

WORK PACKAGE III

Dynamical aspects in quantum systems

WORK PACKAGE I: Hybrid devices: superconducting and topological matter

- T1 In topological insulators
- T2 Bilayer graphene
- T3 Multiterminal Josephson junctions



I-V curves demonstrating our ability to tune the diode from $\sim 100\%$ efficiency for positive currents, through 0% efficiency where positive and negative critical currents are balanced, and to $\sim 100\%$ efficiency for negative currents

WORK PACKAGE II

Quantum thermodynamics: Coherence, and Entanglement

T1 The TUR and KUR in multiterminal conductors

T2 Entanglement generation

T3 Broken time symmetry quantum systems

$$\Delta x \Delta p \geq \hbar/2$$

Thermodynamics of Precision

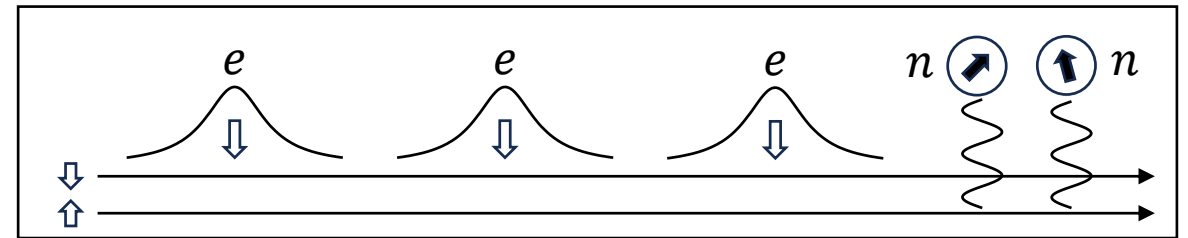
$$\frac{\langle (\Delta \dot{x})^2 \rangle}{\langle \dot{x} \rangle^2} \geq \frac{2k}{\dot{\Sigma}}$$

Dissipation

$$\frac{\langle (\Delta \dot{x})^2 \rangle}{\langle \dot{x} \rangle^2} \geq \frac{1}{A}$$

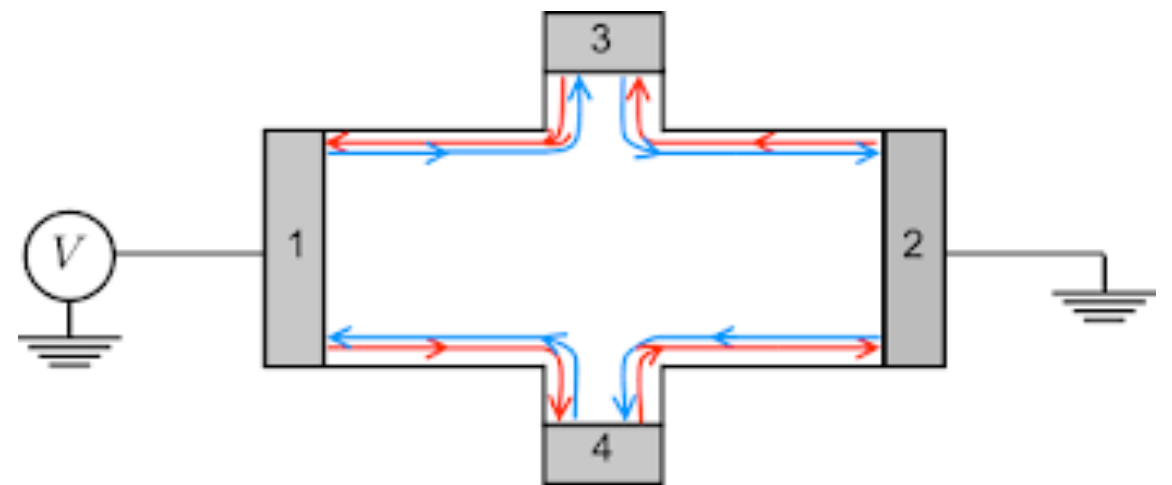
Frenessi
(Activity)

Entanglement generation

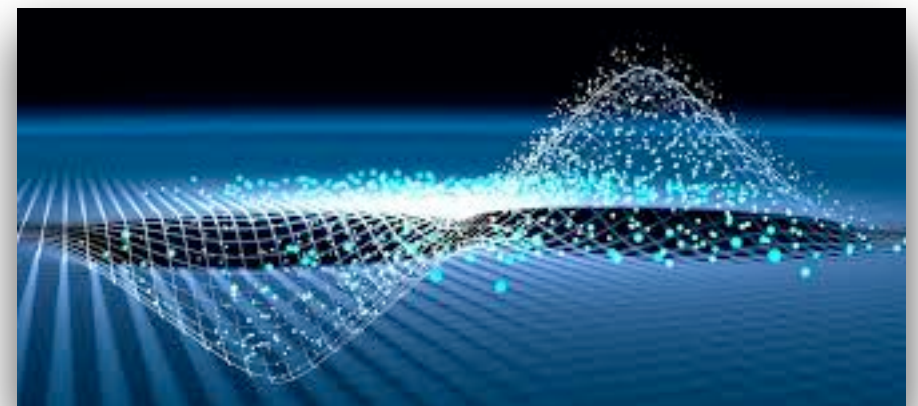


An example for coherent single electron source. Here Ultrafast spin-resolved single electron wave packets are scattered by nuclei spins along edge modes that can generate electronic entanglement

Time reversal symmetry



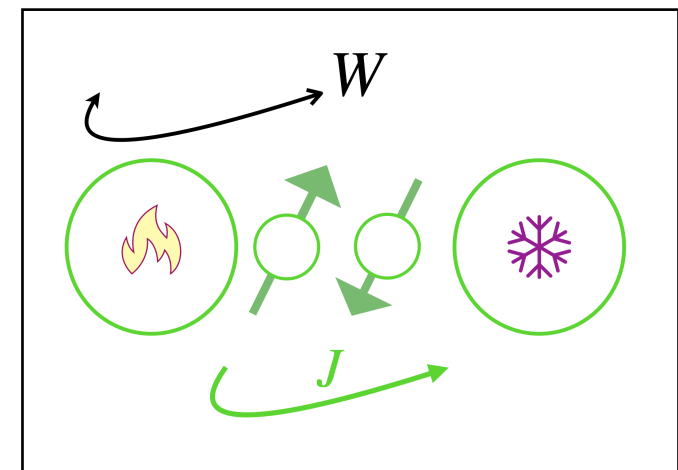
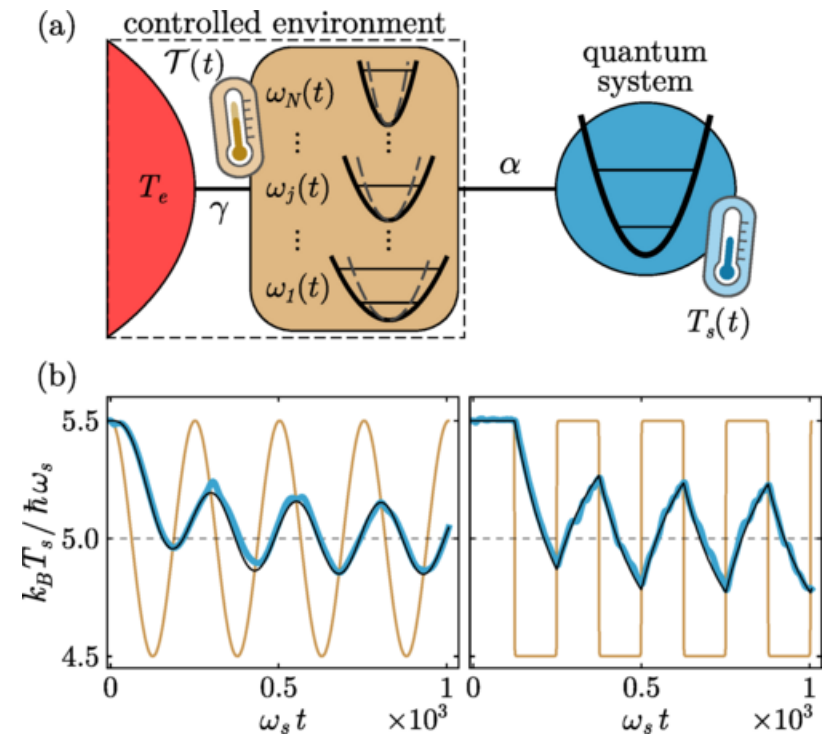
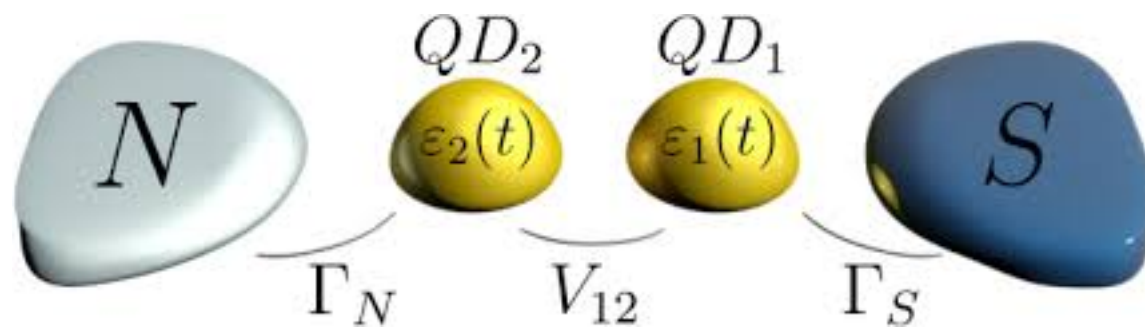
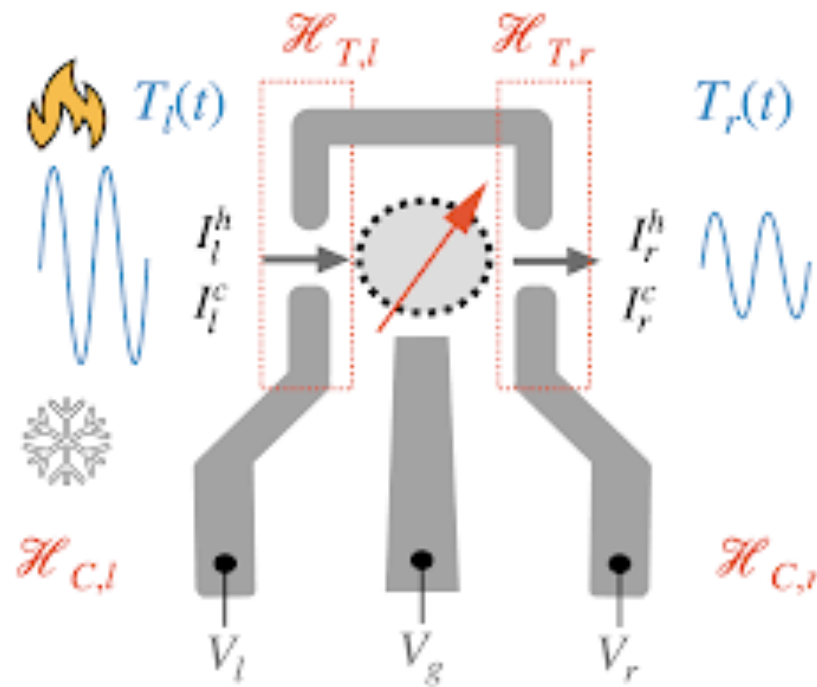
Quantum Coherence



WORK PACKAGE III

Dynamical aspects in quantum systems

- T1 AC-driven temperature quantum dot interferometers
- T2 Coherent single-electron sources as nanoscale thermal machines in ultrafast regime
- T3 AC potential on normal terminals of NS junctions. Floquet formalism



RESEARCH TEAM

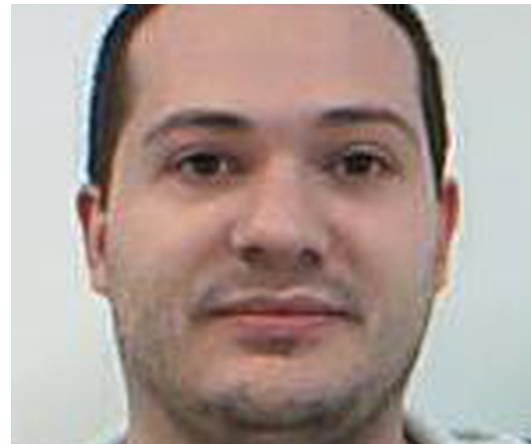
The two Pls



Rosa Lopez



Llorenç Serra



Javier Osca



Sungguen Ryu

WORKING TEAM



Daniele Di Miceli



Michael Moskalets

PROYECTOS DE GENERACIÓN DE CONOCIMIENTO 2023
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Total: 125.000 euros = 100.000 + 25.000 (indirect costs)

Duration: 01/09/2024 -31/08/2027

