

Start of the project OPTOlogic

OPTOlogic project to develop optical topological computing as a means to reduce energy consumption of electronic circuits.

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About 10 % of the world's energy production is used to power electronic circuits that carry out logic operations for the global internet and in consumer devices. The EU-funded OPTOlogic project aims to develop a computing architecture that takes advantage of light-induced and controlled topology for energy-efficient logic operations. To artificially induce and control topological protected states, the project will create a new class of dissipation-less quantum devices, which will be generated through spatially and temporally structured ultrafast pulses of light. These quantum devices will use minimal energy to move and store information, while dramatically increasing computing power. By increasing the energy efficiency and speed of logical operations, the project could have a significant economic, environmental and social impact.

Coordinated by ICREA Prof. at ICFO Jens Biegert, the OPTOlogic consortium includes researchers at ICFO, the Fritz Haber Institute of the Max Plank Society, the French Alternative

Energies and Atomic Energy Commission (CEA) at Saclay, The Max-Born Institute Berlin, and the company LightOn, thus uniting world-leading experimental, theoretical, and industrial expertise in condensed matter physics, ultrafast x-ray spectroscopy, attoscience, quantum optics and computing, machine learning and artificial intelligence.

The consortium aims at developing a new technological platform that leverages the best aspects from topology, to avoid energy loss in electronic transport, light-wave-electronics, to overcome limitations imposed by material properties, and quantum materials with quantum properties that can be used for novel information storage and processing. They will build a novel topological-Qubit, the first elementary building block for the development of this innovative quantum technology, and search to perform quantum logic operations that can surpass those limitations imposed by simple binary operations. The project will use the latest technology in ultrafast x-ray and attoscience, nanotechnology, and quantum computing to develop this new platform.

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