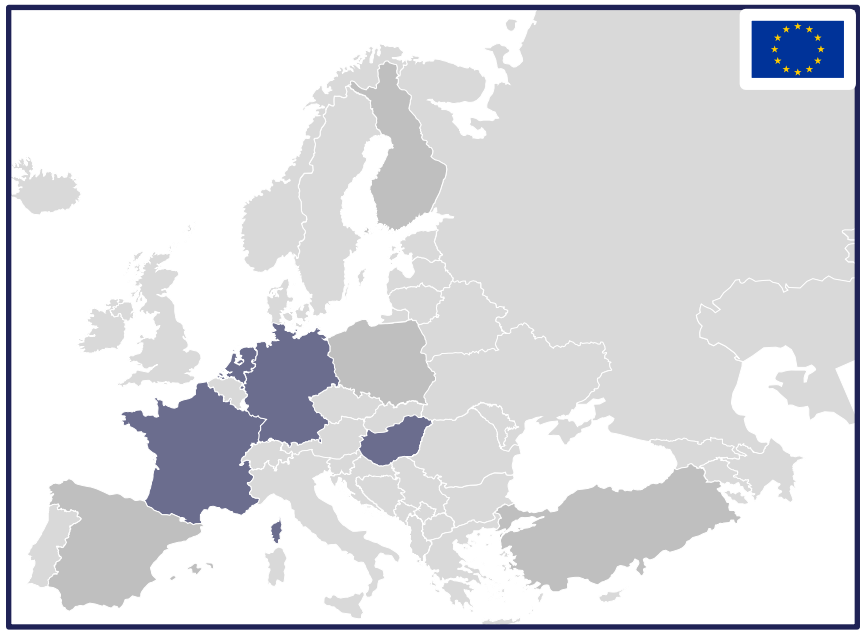
ONCHIPS

Silicon photonics technology allows photonic components to be integrated into a tiny chip. The technology promises greater energy efficiency and lightning-speed processing but comes with a major roadblock: conventional cubic silicon has an indirect band gap, which renders it optically inactive. Unless germanium is added to silicon, in a fully new hexagonal crystal structure, silicon is not good at dealing with light. To overcome this issue, the EU-funded ONCHIPS project aims to build hexagonal germanium-silicon heterostructures for quantum technology applications and realise spin qubits in quantum dots. Furthermore, researchers will build single-photon detectors for light wavelengths exceeding 2 µm. The ONCHIPS novel platform interfacing individual spin qubits and photons could drastically enhance quantum system scalability.

PARTNERS

UNIVERSITY OF TWENTE. | TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY | Technical University of Munich | cnrs | SINGLE QUANTUM | Universität Konstanz



PROJECT ID CARD

Project name : On-chip Integration of Quantum Electronics and Photonics

Coordinator : University of Twente

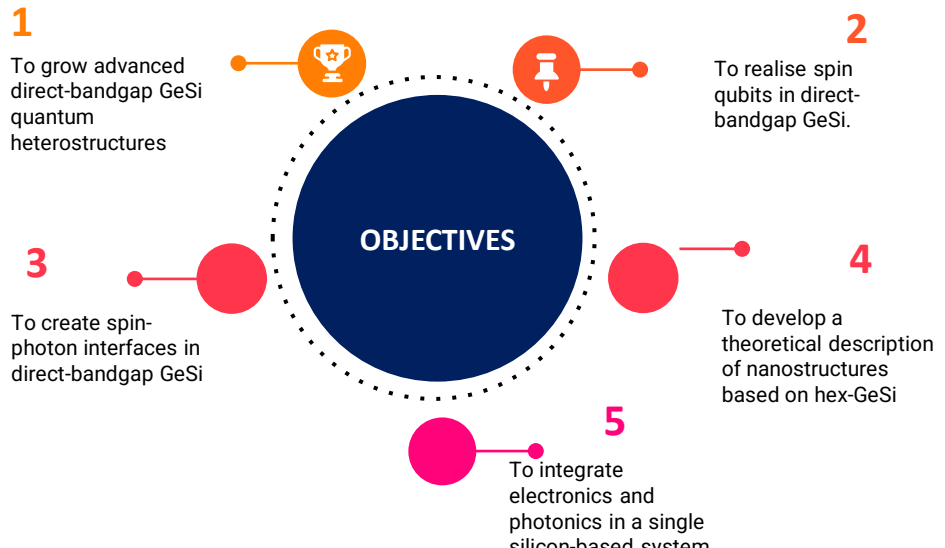
Launch date : 01 October 2022

End date : 30 September 2026

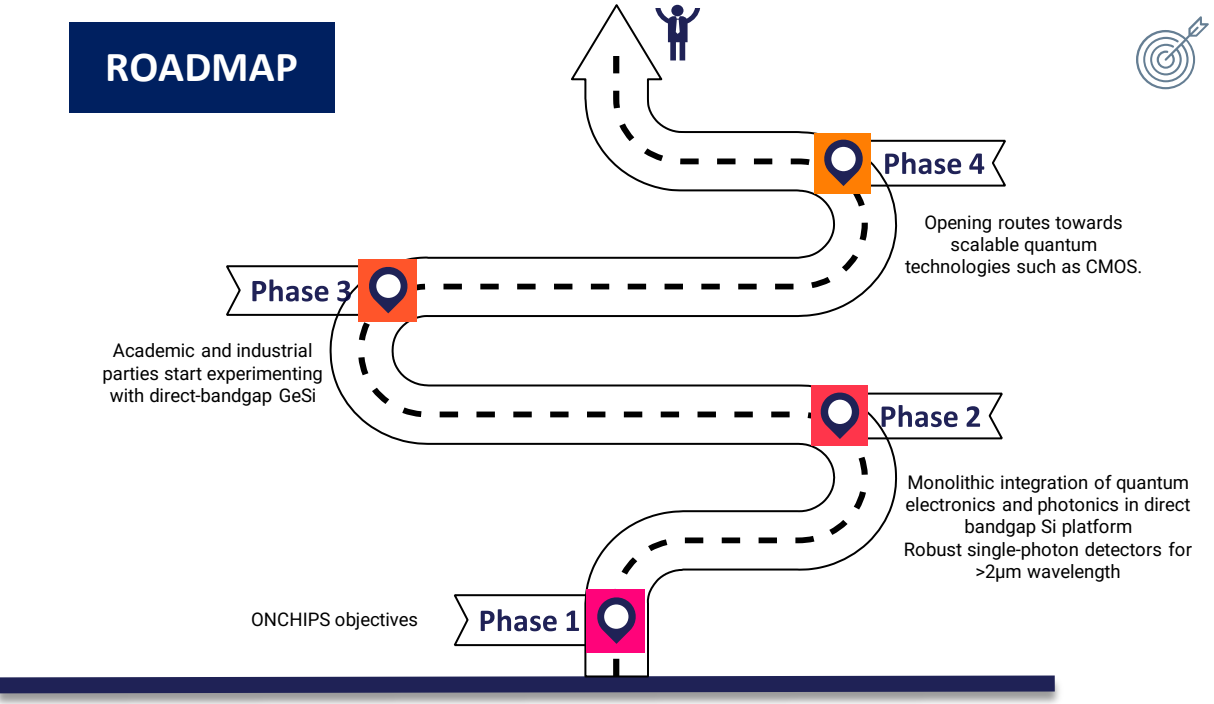
Budget : 3 million

Grant agreement ID : 101080022

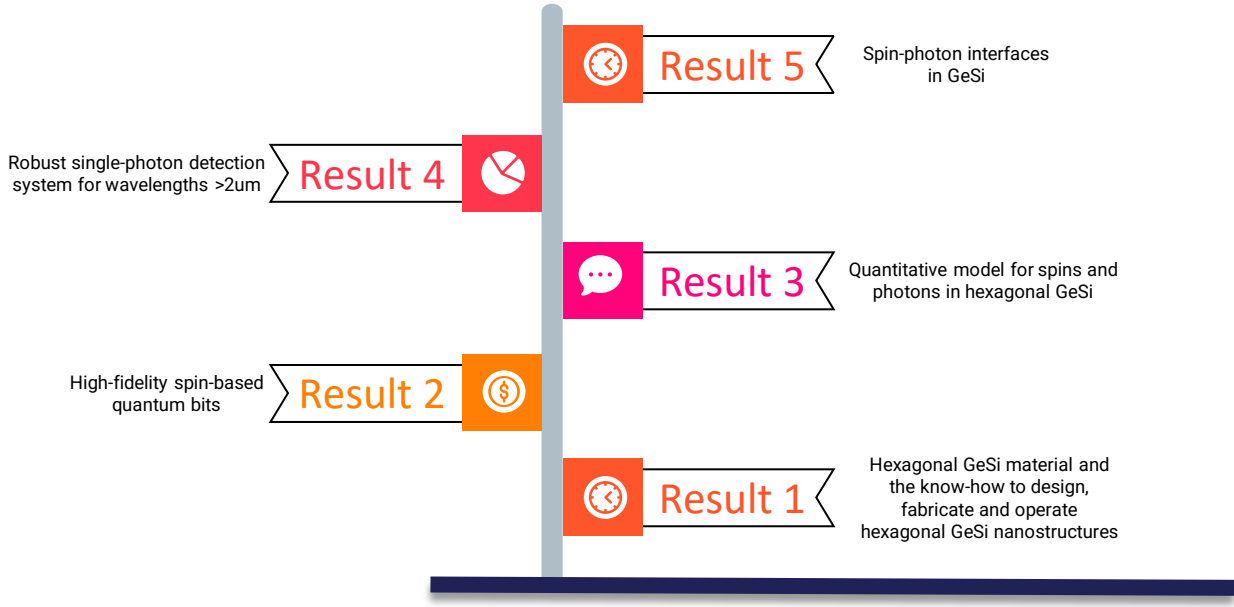
Pillar : II



ROADMAP



RESULTS



How are we impacting your daily life?

Facilitating the use of spin-photon interfaces will advance quantum technologies with impact on:

- Solving long-standing problems related to the health, energy and climate.
- Reducing environmental and toxicological impact of group III-V materials.

Developing single-photon detectors for 2–4 μm wavelength has applications in:

- Biomedical imaging: Imaging microbial consortia and their interaction as well as in-vivo tissue with extended penetration for recognizing and fighting cell diseases.
- Quantum communication: Potentially, long-distance ground-to-ground and ground-to-orbital links for optical quantum secure communication within the atmospheric windows in the 2–4 μm range.