Quantum technology as a Driver of Innovation

Advanced Heterogeneous Integration Packaging Technologies for next Generation Quantum Computing

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Within the the 5-year joint BMBF funded project “Quantum computer in the solid state – Qsolid” the central goal is the development of a fault-tolerant quantum computer based on superconducting qubits and its early integration into the existent super-computing environment at Forschungszentrum Jülich. In this project, a quantum computer demonstrator with processor generations of different performance profiles (size, precision, application reference) based on superconducting circuits will be created.

Fraunhofer IZM-ASSID is involved in the subproject “technology for hardware integration”, in which it works on the task “cryogenic packaging” in cooperation with Globalfoundries, Fraunhofer IPMS and FZJ regarding the co-integration of qubits and adapted control- and readout-electronics into a scalable packaging solution. The main challenge is given by a combination of an effective thermal decoupling and highly dense superconducting wires between the quantum-processing unit and the control electronic devices at cryogenic conditions. Therefore, the silicon-flex-interposer approach developed at IZM-ASSID is of special interest. In detail, the realization of TiN based superconducting wiring and Indium bump bonds including an optimization of interface materials and associated processes on 300 mm wafer level are the key aspects.