FDSOI spin qubits platform for scalable quantum computing

G. Roussely[1], B. Bertrand[1], H. Niebojewski[1], V. Labracherie[1], D. Robert[1], H. Sahin[1], T. Bédécarrats[1], E. Nowak[1], P.-A. Mortemousque[1], E. Chanrion[1], B. Martinez[1], A. Sarrazin[1], F. Boulard[1], J-M. Hartmann[1], B. Cardoso Paz[2], T. Meunier[2], M. Vinet[2], Y.-M. Niquet[3], S. De Franceschi[3]

[1] *CEA-Leti, Univ. Grenoble Alpes, F-38000 Grenoble, France*

[2] *Quobly*

[3] *CEA-Irig, Univ. Grenoble Alpes, F-38000 Grenoble, France*

Silicon (Si) and germanium (Ge) semiconductor spin qubits are promising candidates for large-scale, fault-tolerant quantum computing due to their compatibility with established microelectronics fabrication and their long spin coherence times using isotopically enriched materials [1]. Achieving the million-qubit scale required for full error correction necessitates low device variability [2]. CEA-Leti's FDSOI spin qubit platform addresses this by employing industrial processes [3-5]. This work presents CEA-Leti's latest progress in fabricating scalable linear quantum dot (QD) arrays, prioritizing fabrication yield and uniformity for reliable operation at room and cryogenic temperatures. We also introduce new room-temperature parametric tests specific to these devices and highlight the benefits of using the back-gate for independent control of QD readout and exchange regimes. This work is partly funded by the EU through the H2020 QLSI project and the European Research Council (ERC) Synergy QuCube project.

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