MULTI-SCALE MODELING OF THE ELECTROMAGNETIC QUANTUM DOT ENVIRONMENT (POST-DOC)

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In the near future, emerging quantum information technologies are expected to lead to global breakthroughs in high performance computing and secure communication. Among semiconductor approaches, silicon-based spin quantum bits (qubits) are promising thanks to their compactness featuring long coherence time, high fidelity and fast qubit rotation [Maurand2016], [Meunier2019]. A main challenge is now to achieve individual qubit control inside qubit arrays. Qubit array constitutes a compact open system, where each qubit cannot be considered as isolated since it depends on the neighboring qubit placement, their interconnection network and the back-end-line stack. The main goal of this post-doctoral position is to develop various implementation of spin control on 2D qubit array using multi-scale electromagnetic (EM) simulation ranging from nanometric single qubit up to millimetric interconnect network. The candidate will i) characterize radio-frequency (RF) test structures at cryogenic temperature using state-of-the-art equipment and compare results with dedicated EM simulations, ii) evaluate the efficiency of spin control and allow multi-scale optimization from single to qubit arrays [Niquet2020], iii) integrate RF spin microwave control for 2D qubit array using CEA-LETI silicon technologies. The candidate need to have a good RF and microelectronic background and experience in EM simulation, and/or design of RF test structures and RF characterization. This work takes place in a dynamic tripartite collaborative project between CEA-LETI, CEA-IRIG and CNRS-Institut Néel (ERC “Qucube”).

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