RIKEN QUANTUM COMPUTING

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23rd RQC Colloquium

The role of silicon in quantum computing

Prof. John J.L. Morton

UCL, Quantum Motion, Phasecraft

April 24, 2024(Wed) **16:00–17:00**(JST)

This colloquium will be held in **ONLINE**.

Online Venue: Zoom. To receive the link, register in advance at https://krs2.riken.jp/m/rqc_registration_form

Silicon dominates today's information technology industry, having repeatedly replaced the incumbent technology platform in diverse applications, but what will its role be in quantum computing? Spins bound to donor atoms in silicon offer some of the longest quantum coherence times of any solid-state system and, with the right microwave interface, could form a powerful multi-mode quantum memory element in hybrid quantum processor architectures. Quantum processors require sophisticated control and read-out electronics, while most currently leading platforms operate at cryogenic temperatures of 4 Kelvin or below. Cryogenic CMOS circuits of increasing complexity have been designed and demonstrated to run at such temperatures, opening a route to tightly integrating control electronics with quantum devices. Finally, MOS devices fabricated on 300mm wafers, similar to those used in the silicon CMOS transistor industry today, can be used to form spin qubit arrays capable of implementing versatile quantum computing architectures. I will discuss recent progress at UCL and Quantum Motion towards the above goals and show how silicon could play a major role in the future quantum computing industry.