Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad - 500107

Colloquium

Strongly coupled multi-qubit systems using superconducting quantum circuits

R. Vijayaraghavan

TIFR, Mumbai

Storing and processing information using quantum two level systems (qubits) promises tremendous speed-up for certain computational tasks like finding prime factors and for simulation of quantum systems. Superconducting electronic circuits operating at millikelvin temperatures have emerged as a leading candidate for building such a quantum processor. One key requirement is controlling and manipulating the interactions between multiple qubits. Rather than using single qubit circuits as building blocks, I will introduce a novel three-qubit superconducting device as an elementary block. The device, nicknamed “trimon” [1] implements three qubits with pairwise longitudinal coupling. The always-on coupling enables simple implementation of generalized controlled rotations using transition selective pulses. I will describe how to harness the full three-qubit computational space and discuss the implementation of several multi-qubit gates like CNOT and Toffoli gate. I will conclude by discussing possible applications of this device and further extensions to this idea.

References:

[1] Phys. Rev. Applied 7, 054025 (May 2017)

Friday, Aug 18th 2017

04:00 PM (Tea/Coffee at 03:45 PM)

Auditorium, TIFR (FReT-B)