International Year of Quantum Science and Technology (IYQ)-2025, at TCG CREST (Kolkata, India)

Speaker

Prof. R. Srikanth

Poornaprajna Institute of Scientific Research, Bengaluru, India

Areas of Interest:

- Foundations of quantum mechanics.
- Quantum information science (cryptography and noisy channels).
- Solar physics: super-granular network structure and dynamics.
- Philosophy of science: causality, free will, computability, individuation and identity.

Title: Concatenating decoherence-free subspaces with quantum error correcting codes

Abstract

Decoherence-free subspace (DFS) and Quantum error-correcting codes (QECCs) provide passive and active means, respectively, to fight noise in quantum information processing. The former technique is suitable to correct errors with certain symmetries, whilst the latter can correct independent errors. The concatenation of the two techniques can be useful in universal fault-tolerant quantum computation when a mixture of independent and correlated errors occur. We show that the concatenation of a QECC and a DFS code naturally results in a degenerate code having both actively and passively correcting parts, with the degeneracy impacting both parts. We find that when correlated (resp., independent) errors are sufficiently strong, the concatenation with the DFS (resp., QECC) as the inner code provides better performance, as quantified by entanglement fidelity. As illustrative examples, we consider the concatenation of a two-qubit DFS code and a three-qubit repetition code or five-qubit Knill-Laflamme code.

Date & Time:

20th March 2025 @ 4:00 PM IST

Venue:

Classroom-4, TCG CREST

Join Zoom Meeting: Click here to join

(or)

Join YouTube Live: @tcgcrest357

Organized by:

CQuERE (Centre for Quantum Engineering, Research and Education), TCG CREST, Kolkata, INDIA

For more details, please visit the website: http://www.tcgcrest.org/iyq2025

For any queries, feel free to contact us through the email: iyq.2025@tcgcrest.org