Contribution ID: **33**

Type: **Poster**

Suppressing decoherence in quantum computers with unitary operations

Decoherence is a fundamental obstacle to the implementation of large-scale and low-noise quantum computing devices. In the present work, we investigate the role of the fidelity of finite-dimensional quantum systems in the context of their robustness to decoherence. We suggest an approach for suppressing errors by employing pre-processing and post-processing unitary operations, which precede and follow the action of a decoherence channel. The suggested approach relies on specifically designed unitary operators for a particular state without the need in ancillary qubits or post-selection procedures. We consider the realization of our approach for the basic decoherence models, which include single-qubit depolarizing, dephasing, and amplitude damping channels. We demonstrate that for the case of depolarization channels there is a general relation between linear entropies of quantum states and fidelities of the quantum state after the action of the depolarizing channel on a particular subsystem of quantum states. We prove the general relation between linear entropies of quantum states for depolarization channels and illustrate it for qubit systems and we consider a generalization of the suggested approach for qudit ensembles.

Presenter: MASTIUKOVA, Alena (Moscow Institute of Physics and Technology, National Research University)

Session Classification: Beers and Posters