Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally Mandal, Ranga Reddy Dist., Hyderabad – 500 046

Seminar

Optimal control in monitored quantum systems with applications to quantum algorithms for solving classical optimization problems

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The CDJ (Chansari-Dressel-Jordan)-Pontryagin framework enables the computation of most-likely-path-based optimal control in continuously monitored quantum systems. This formalism had been successfully applied to state preparation and single-qubit Zeno dragging problems. In my talk, I will present our work on prescribing a CDJ-Pontryagin optimal control protocol for general continuously monitored systems. For monitored oscillators, we find a 40-196% increase in the state-preparation success probabilities compared to non-optimal controls. Furthermore, we apply the CDJ-Pontryagin approach to find the optimal Zeno-dragging schedule for hard 3-SAT problems with up to five qubits. Comparing with the optimal dynamics under Lindbladian evolution, we find that a postselected CDJ-Pontryagin optimization yields a higher mean fidelity with respect to the target state. Our work provides novel insights into speeding up quantum algorithms for solving classical optimization problems using quantum optimal control. SAT problems are ubiquitous in biological systems, communication networks, etc. Therefore, our analysis is directly relevant to the search for quantum advantage in real-world applications.

Friday, May 29th 2026

16:00 Hrs (Tea / Coffee 15:45 Hrs)

Seminar Hall, TIFRH