



Der Vorsitzende des Promotionsausschusses

EINLADUNG

Hiermit lade ich ein zum öffentlichen Promotionskolloquium von

Herrn M.Sc. Ashutosh Mishra

Theoretische Physik
(Prof. Dr. Frank Wilhelm-Mauch)

am

Montag, 21. September 2026, 14:30 Uhr s.t.

per Videokonferenz: Link für MS Teams: <https://go.fzj.de/mishra-defense>

Raum für die Prüfung: Gebäude E2.6, Seminarraum E.04

Thema der Dissertation:

Open-loop quantum control for practical superconducting quantum systems

Quantum optimal control (QOC) enables the design of high-fidelity, robust quantum operations, but its computational cost scales poorly with system size and imposes significant constraints on pulse parameterization. This thesis explores the development and application of QOC methods for superconducting quantum computers. We propose a protocol to combine fundamental operations like qubit readout and reset to reduce wait time between experiments. We then introduce an open-loop QOC method that efficiently computes gradients of large quantum systems with respect to arbitrary pulse parameterization, and extend it to robust quantum control. Finally, we present ParaQeet, an open-source package that incorporates hardware limitations and streamlines the optimization workflow. Together, this work advances QOC methods suited to designing quantum operations under practical constraints.

Saarbrücken, 7. September 2026



Prof. Dr.-Ing. Georg Frey