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# Evaluation of Numerical Methods for the Quark Propagator

*Tuesday 4 November 2025 18:00 (1h 30m)*

Recent advances in numerical algorithms for matrix function evaluations have significantly improved the stability and efficiency of large-scale computations in quantum field theory. In this study, we investigate their applicability to the calculation of the quark propagator in lattice QCD. The quark propagator, which involves the inversion and functional evaluation of large sparse matrices derived from the Dirac operator, poses a stringent test for numerical precision and algorithmic robustness. We compare several iterative and polynomial-based approaches, including Krylov subspace and rational approximation methods, focusing on their convergence behavior and numerical stability under realistic lattice conditions. Our results demonstrate how recent developments in numerical linear algebra can enhance the accuracy and reliability of quark propagator computations, providing valuable insights for future high-precision studies in lattice gauge theory.

## Parallel Session (for talks only)

Algorithms and artificial intelligence

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