

# Quantum Algorithm for the Fokker-Planck Equation in Cosmology

*Wednesday, 4 March 2026 11:10 (20 minutes)*

In this talk, we present a quantum algorithm for numerically solving the Fokker-Planck equation that describes the stochastic processes in cosmology. In particular, we consider the discretization in which time evolution is represented via (sub-)stochastic transition matrices. Based on this discretization, the computation of time evolution of the numerical solution to the Fokker-Planck equation becomes repeated multiplication of the transition matrices, suggesting the possibility of an implementation via quantum algorithms. We present a method to implement this repeated matrix multiplication using a quantum matrix inversion algorithm [1] based on Quantum Singular Value Transformation (QSVT) [2]. As an application, we demonstrate how this method can be used to analyze the phase transition to eternal inflation in cosmic inflation [3].

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