

”From Vlasov-Poisson to Schrödinger-Poisson: dark matter simulation with a quantum variational time evolution algorithm”

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“Recent studies showed an interesting mapping of the 6-dimensional+1 (6D + 1) collisionless fluid (Vlasov-Poisson) problem into a more amenable 3D + 1 non-linear Schrödinger-Poisson (SP) problem for simulating the evolution of DM perturbations. This opens up the possibility of improving the scaling of time propagation simulations using quantum computing. We propose a rigorous formulation of a variational-time evolution quantum algorithm for the simulation of the SP equations to follow DM perturbations and investigate the transition of the SP dynamics towards the classical ($\hbar/m \rightarrow 0$) limit.”

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