Solving the Transient Dyson Equation with Quasilinear Complexity via Matrix Compression

Baptiste Lamic*[1]

[1]PHotonique, ELectronique et Ingénierie QuantiqueS – CEA INAC - PHELIQS – 17 rue des Martyrs F-38054 Grenoble Cedex 9, France

Résumé

We introduce a numerical strategy to efficiently solve the out-of-equilibrium Dyson equation in the transient regime. By discretizing the equation into a compact matrix form and applying state-of-the-art matrix compression techniques, we achieve significant improvements in computational efficiency, which result in quasi-linear scaling of both time and space complexity with propagation time. This enables to compute accurate solutions even for systems with multiple and disparate time scales. We benchmark our solver by simulating a voltage-biased Josephson junction formed by a quantum dot connected to two superconducting leads

*Intervenant