Seminar, Department of Physical Sciences, Bose Institute, Kolkata

Thermalization via Quantum Homogenization

Tanmay Saha (IMSc)

Abstract: Collisional models are a category of microscopic framework designed to study open quantum systems. The framework involves a system sequentially interacting with a bath comprised of identically prepared units. In this regard, quantum homogenization is a process where the system state approaches the identically prepared state of the bath unit in the asymptotic limit. Here, we study the homogenization process for a single qubit in the non-Markovian collisional model framework generated via additional bath-bath interaction. With partial swap operation as both system-bath and bath-bath unitary, we demonstrate that homogenization is achieved irrespective of the initial states of the system or bath units. This is reminiscent of the Markovian scenario, where partial swap is the unique operation for a universal quantum homogenizer. On the other hand, we observe that the rate of homogenization is slower than its Markovian counterpart. Interestingly, a different choice of bath-bath unitary speeds up the homogenization process but loses the universality, being dependent on the initial states of the bath units.

Article reference: New Journal of Physics 26 (2), 023011 (2024)

Date/time: January 30, 2025 (Thursday) at 12:00 Noon

Venue: Room 204, Physics Seminar Room, (Second floor, UAC, BI)