

## **Seminar**

### **Energetics of quantum Brownian oscillators**

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In this talk, I will present some results on the energetics of a quantum oscillator interacting with a passive heat bath. Based on the microscopic system+bath approach leading to the quantum Langevin equation, we recall two distinct notions of energy, namely, the internal energy and the mean energy. It will be demonstrated that the mean and internal energies are inequivalent whenever the bath-induced damping force is non-Markovian, but become equal to one another in the Markovian limit describing strictly-Ohmic dissipation (however, both of them diverge in this limit). I shall describe the quantum counterpart of energy-equipartition theorem which provides an interpretation of the thermally-averaged energies in the language of superstatistics. Following this, a generalised quantum-mechanical virial theorem shall be presented which exhibits novel bath-induced terms that render the thermally-averaged kinetic and potential energies of the oscillator unequal; the equality is restored either in the classical limit or in the weak-coupling (Markovian-noise) limit. Finally, I will present some results for a charged Brownian oscillator which interacts with a uniform magnetic field.

***Thursday, Sep 12<sup>th</sup> 2024***

***16:00 Hrs (Tea / Coffee 15:45 Hrs)***

***Seminar Hall, TIFR-H***