Cooperative Dynamics in Quantum Domain: Symmetry Breaking and More

Invited Talk 10

Tanmoy Banerjee

Department of Physics, University of Burdwan, West Bengal, India

Exploring cooperative dynamics in open quantum systems has recently been a vibrant topic of research. The well known dynamical manifestations of emergent dynamics, such as synchronizations and symmetry breaking are well understood in the classical domain, however, their behavior in the quantum domain is still elusive. Studies on this problem require formalism from open quantum system that rely on the construction and solution of quantum master equations, which are nontrivial and thus challenging. In this talk I will explore the concept of quantum limit cycle in dissipative quantum systems and discuss some intriguing emergent dynamics such as symmetry-breaking transitions [1,2] and quantum aging transition [3] in a network of coupled quantum oscillators.

References

[1] B. Paul, B. Bandyopadhyay, T. Banerjee. Attractive-repulsive interaction in coupled quantum oscillators. Phys. Rev. E **108**, 024301, 2024

[2] B. Bandyopadhyay, T. Banerjee. Kerr nonlinearity hinders symmetry-breaking states of coupled quantum oscillators. Phys. Rev. E **106**, 024216, 2022.

[3] B Bandyopadhyay, T. Banerjee. Aging transition in coupled quantum oscillators. Phys. Rev. E **107**, 024204, 2023.