

## Quantum Transport: Coherence, and Symmetry, and Diffusivity

J. Cao<sup>1</sup>

(1) Massachusetts Institute of Technology-MIT (USA).

Transport in nano-scale systems often display intriguing quantum mechanical effects, which will be illustrated using examples such as the non-equilibrium spin-boson model, energy transfer networks, and three-level energy transfer systems. Using these examples, we hope to demonstrate non-trivial quantum effects: polaron-induced coherence, multiple steady-state solutions, and ballistic-diffusive transition. Our analysis will shed light on the coherent nature in quantum transport and will be relevant for the design and control of nano-scale quantum devices.

- [1] Dynamical signatures of molecular symmetries in non-equilibrium quantum transport. J. Thingna, D. Manzano, and J. Cao, *Sci. Rep.* **6**, 28027 (2016)
- [2] Quantum transport in d-dimensional lattices. D. Manzano, C. Chuang, and J. Cao, *New J. Phys.* **18**, 043044 (2016)
- [3] Polaron effects on the performance of light-harvesting systems: A quantum heat engine perspective. D. Xu, C. Wang, Y. Zhao, and J. Cao, *New J. Phys.* **18**, 023003 (2016)
- [4] Nonequilibrium energy transfer at nanoscale: A unified theory from weak to strong coupling. C. Wang, R. Jie, and J. Cao, *Sci. Rep.* **5**, 11787 (2015)
- [5] Unifying quantum heat transfer in non-equilibrium spin-boson model with full counting statistics, Chen Wang, Jie Ren, and Jianshu Cao *Phys. Rev. A* (2017)