



Quantum many-body probes

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Quantum phase transitions manifest themselves in various forms, each with their own features. In particular, criticality is known to be a resource for quantum enhanced sensitivity. In this talk, we investigate various forms of criticality to find out what features in these phase transitions are responsible for achieving quantum enhanced sensitivity. In particular, we explore Stark localization [1], symmetry protected topological systems [2], Floquet systems for both DC [3] and AC [4] and boundary time crystals [5]. While phase transition in these systems may have different origins, there is one common feature among all of them: gap closing. This suggests that gap closing is the main feature in phase transitions which is responsible for quantum enhanced sensitivity.

References:

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- [3] U. Mishra, A. Bayat, Phys. Rev. Lett. 127, 080504 (2021)
- [4] U. Mishra, A. Bayat, Scientific Reports 12, 14760 (2022)
- [5] V. Montenegro, M. G. Genoni, A. Bayat, M. G. A. Paris, arXiv:2301.02103