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Title of the Poster: Quantum Dynamics of a Spin Model with an Extensive Degeneracy.

Abstract:

In this poster, I present my recent research on quantum dynamics of a one-dimensional spin model having an extensive degenerate manifold of states for a specific value of one of the parameters of its Hamiltonian. The primary focus will be on the role played by extensive degeneracy in shaping the nature of the quantum dynamics of this type of model for both ramp and periodic drive protocols.

For the ramp protocol, this poster will emphasize the deviation from the usual Kibble-Zurek behavior when a linear ramp which takes the spin model through this degenerate point and the dramatic suppression of Stücklberg oscillations for a ramp that passes twice through the degenerate point. Additionally, results will also be presented showing how large degeneracy profoundly alters the dynamical signatures one would normally expect from a system having a quantum critical point.

The poster will also illustrate the periodic dynamics of the model and showcasing the results on existence of special drive frequencies for a large drive amplitude, at which the system exhibits an approximate emergent U(1) symmetry, and will also represent the effect of this emergent symmetry on the correlators of the driven system and demonstrate the existence of dynamic symmetry restoration at these frequencies.

The finding in the poster underscores the complex and rich unconventional quantum dynamic that emerges as a consequence of extensive degeneracy, and it also outlines potential experimental routes to explore and implement these effects using ultracold Ry-dberg atom setups.

Reference:

K. Ghosh, D. Sen, and K. Sengupta, "Quantum dynamics of a spin model with an extensive degeneracy," arXiv:2502.07609 [quant-ph] (2025).