

## **The relaxation dynamics of the XY Mean Field Hamiltonian model**

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We use a topological approach to analyze the nature of quasi-stationary states of the Mean Field XY Hamiltonian model that arise when the system is initially prepared in a fully magnetized configuration. By means of numerical simulations and analytical considerations, we show that, along a quasi-stationary trajectory, the system evolves in a manifold of critical points of the potential energy function.

Although these critical points are maxima, the large number of directions with marginal stability may explain the slow relaxation dynamics and the trapping of the system in such trajectories.