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Many-body quantum scars from geometric frustration[1] RONALD MELENDREZ, KYUNGMIN LEE, FSU NHMFL, FL USA, ARIJEET PAL, University College London UK, HITESH CHANGLANI, FSU NHMFL, FL USA —
Integrable and many-body localized systems exhibit athermal behavior that violates the eigenstate thermalization hypothesis. However, recent experimental and theoretical works have found athermal behavior for dynamics of special initial states in an otherwise non-integrable clean system in one dimension; such states have been dubbed as Quantum Many Body scars (QMBS). We demonstrate the presence of QMBS in high dimensional systems, with the help of a spin-1/2 nearest neighbor XXZ Hamiltonian with "staggered interactions" on the two dimensional highly frustrated kagome lattice. The model is inspired by a previously reported special point [H. J. Changlani et al. Phys. Rev. Lett. 120, 117202 (2018)] where the ratio of Ising to XY couplings is -1/2, which was shown to harbor "three-colored" ground states. We show how QMBS are embedded in the many-body spectrum, and study their time evolution using the Loschmidt echo and local spin observables. We also explore the stability of QMBS to periodic drives, eg. in the form of an applied pulsed transverse magnetic field.

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