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Quasiparticle explanation of "weak thermalization" regime under quench in a non-integrable quantum spin chain CHENG-JU LIN, OLEXEI MOTRUNICH, Caltech — Eigenstate Thermalization Hypothesis provides one picture of thermalization in a quantum system by looking at individual eigenstates. However, it is also important to consider how local observables reach equilibrium values dynamically. Quench protocol is one of the settings to study such questions. A recent numerical study [Banuls, Cirac, and Hastings, Phys. Rev. Lett. **106**, 050405 (2011)] of a nonintegrable quantum Ising model with longitudinal field under such quench setting found different behaviors under different initial quantum states. One particular case termed weak thermalization regime showed apparently persistent oscillations of some observables. Here we provide an explanation of such oscillations. We use perturbation theory near the ground state of the model, and identify the oscillation frequency as the quasiparticle mass. With this quasiparticle picture, we can then address the long-time behavior of the oscillations.

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