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Confined Dynamics of a Linear Spin Chain After a Quench using a Trapped Ion Quantum Simulator[1] H.B. KAPLAN, G. PAGANO, W.L. TAN, F. LIU, A.V. GORSHKOV, C. MONROE, JQI, University of Maryland, JOINT QUANTUM INSTITUTE, UNIVERSITY OF MARYLAND DEPARTMENT OF PHYSICS AND NIST COLLABORATION — Trapped-ion quantum simulators are pristine quantum platforms to investigate out-of-equilibrium many-body systems. Here we report an experimental study of the dynamics in a transverse field Ising model with tunable long range interactions after a quantum quench [1, 2]. We observe a regime in which the spreading of correlations is bounded and the magnetization dynamics is a direct probe of low energy quasi-particle excitation confinement [3]. The experiment is explained using a 'two kink' model, which considers a linear spin chain with only two domain walls [4]. We plan to extend this experiment by looking directly at spin correlation propagation and to look at finite size scaling effects by performing the experiment with longer ion chains. [1] P. Richerme, et al, *Nature* **volume511**, pages198–201 (10 July 2014) [2] J. Zhang, et al, *Nature* **volume551**, pages601–604 (30 November 2017) [3] M. Kormos, et al, *Nature Physics* **volume13**, pages246–249 (2017) [4] F. Liu, et al, arXiv:1810.02365

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