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1D Chain of Interacting Majorana Bound States at the Edge of a Topological Insulator VASUDHA SHIVAMOGGI, JOEL MOORE, University of California, Berkeley — We study a realization of a 1d chain of Majorana bound states that consists of alternating ferromagnetic and superconducting regions at the edge of a quantum spin hall insulator. Each boundary between a ferromagnetic and superconducting region supports a Majorana bound state, and the pair-wise interaction energies have previously been calculated in the weakly interacting limit. By adjusting the phases of the order parameters in these regions, it is possible to create a Majorana bound state localized at each interface. In the limit of well separated Majorana fermions, the system can be mapped to the transverse field Ising model. To reach the random critical Majorana chain studied by Bonesteel and Yang, the phases of the ferromagnetic and superconducting order parameters must be drawn from essentially the same random distribution. We examine factors in an experimental system that will move the system away from the critical point, such as Coulomb interactions and breaking of the duality between the ferromagnetic and superconducting regions.

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