

Abstract Submitted  
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**Domain Walls and Roughening Transition Possibilities in a Transverse-field Ising Model with Long-range Interactions** GEORGE MIAS, Yale University, STEVEN GIRVIN, Yale University — We have studied domain walls and domain wall roughening in the presence of long-range interactions. The insulating system  $\text{LiHoF}_4$  is a physical realization of the transverse-field Ising model, which is known to have an order-disorder quantum phase transition between ferromagnetic and paramagnetic states. Furthermore due to long-range dipole interactions,  $\text{LiHoF}_4$  naturally forms thin needle-like domains which might suggest the possibility of a roughening transition for the domain walls, on the grounds that it is expected for the standard short-range transverse-field Ising model. We will describe how the long-range forces which are responsible for the domain formation also affect the nature of the domain wall structure and account for the absence of a roughening transition.

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