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Quantum Phase Transitions with Spin Frustration in a Trapped Ion System KIHWAN KIM, MING-SHIEN CHANG, SIMCHA KORENBLIT, KAZI RAJIBUL ISLAM, CHRISTOPHER MONROE, JQI and Department of Physics, University of Maryland, College Park, MD 20742-4111 — We discuss the use of a linear array of trapped ions for quantum simulations of spin chains with long range interactions [1,2]. In particular, we study interesting phase diagrams with only a few ions that involve multiple normal modes of motion and can feature spin frustration. With trapped ions, there is a potential to directly study the entanglement structure in such exotic ground state spin phases.

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