Spin-boson lattice models: Lieb-Robinson bounds, Ising phase transitions, and Luttinger liquids

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In this talk, I will present our results on the study of hybrid lattice models composed spins and bosons interacting with each other. In particular, I will address three topics: (i) The possibility of deriving fundamental limits for the speed of propagation of spin-spin correlations (i.e. Lieb-Robinson bounds). (ii) The existence of a quantum phase transition in the Ising universality class that involves spins and boson on the same footing. (iii) The prospects of finding spin-boson instances of the Luttinger-liquid universality class. I will also discuss their connection to ion-trap and superconducting-circuit architectures.