

Abstract Submitted
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Achieving tunable critical exponents in quantum XXZ model using trapped ions FAN YANG, FEI ZHOU, Univ British Columbia — We study the quantum phase transition of the ferromagnetic XXZ model with power-law-decay spin-spin interactions in an external magnetic field. We study this system by mapping the spins with long-range interactions to a dilute gas of strongly interacting magnons with anomalous dispersion. Using ϵ expansion and working below upper critical dimension, we find that the critical exponent is continuously dependent on the exponent of the power-law-decay. Effective quantum spin systems with such kind of interactions can be simulated with trapped ions interacting with lasers using established experimental techniques. By adjusting the laser parameters, one can experimentally observe quantum phase transitions with different critical exponents in the same physical system.

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