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Quantum phase transitions in the transverse 1-D Ising model with four-spin interactions[1] O. F. DE ALCANTARA BONFIM, University of Portland, Portland, Oregon, J. FLORENCIO, Universidade Federal Fluminense, Niteroi, Brazil — In this work we investigate phase transitions in the transverse Ising model with four-spin interactions, induced by quantum fluctuations. The model is relevant to the physics of poly(vinylidenefluoride-trifluoroethylene)[P(VDF-TrFE)]. We calculate the ground state and the first excited state energies of the system using Lanczos method. Our calculations are performed using rings up to 20 spins. Finite size scaling is applied to the energy gap to obtain the boundary region where a ferromagnetic to paramagnetic transition takes place, as well as the corresponding critical exponents. A new degenerate <3,1> phase region is found. The first-order transition boundary between this new phase and the paramagnetic phase is determined by analyzing the behavior of the transverse spin magnetization as the system moves from one region to the other.

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