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Monte Carlo Method Study of Thin Films of The Spin-1 Ashkin **Teller Model in the Presence of the Crystal Field**

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ABSTRACT

Using Monte Carlo simulations based on the Metropolis algorithm, we have investigated magnetic properties and phase diagrams of the spin-1 Ashkin Teller model magnetic thin films. The effects of the crystal field D/J_{2b} and four-spins coupling $(J_{4s}/J_{2b}, J_{4b}/J_{2b})$, has been studied in detail. Therefore, the phase diagrams in the $(k_B T_c/J_{2b}, J_{2s}/J_{2b})$ plane, exhibits the special point $(R_s = J_{2s}/J_{2b})_{sp}$, for different values of D/J_{2b} , wherein all film thicknesses having the same critical temperature. In addition, the magnetization profiles present a first order phase transition behavior. Then, we found rich phase diagrams with first- and second-order phase transitions that meet at tricritical points, that are dependent on the film thickness N.

Keywords: Thin Films, Ashkin Teller model, Phase diagrams, Crystal field, Special point.

