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Different Phases in an Alternating Spin-1 – Spin-1/2 System

M. Georgiev, **H. Chamati**

Institute of Solid State Physics, Bulgarian Academy of Sciences,
Tsarigradsko Chaussee 72, 1784 Sofia, Bulgaria

Abstract. For the past two decades quantum magnets and quantum spin liquids continue to be the focus of attention. In recent years there has been a lot of theoretical studies of one-and two-dimensional spin models, involving biquadratic and three-body exchange terms. Of great interest are the spin-one systems on a square lattice [1,2] and a triangle lattice [3,4]. The occurrence of exotic non-magnetic phases, such as different nematic phases, have been widely discussed [5,6]. Meanwhile mixed spin systems have attracted the attention of many condensed matter physicists due to their peculiar low-temperature properties. Such systems are studied in references [7] and [8] by means of Schwinger boson mean-field theory and variational theory, respectively. Very recently interesting results have been reported for models accounting for the effect of an extra-isotropic three-body exchange term [9] and the XXZ biquadratic interaction [10].

We investigate the variational and quantum ground state phase diagrams of a two-dimensional mixed system with alternating spin-1 and spin-1/2, based upon the interplay between bilinear and biquadratic couplings. The interaction extends to next-nearest neighbours in addition the nearest-neighbors.

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