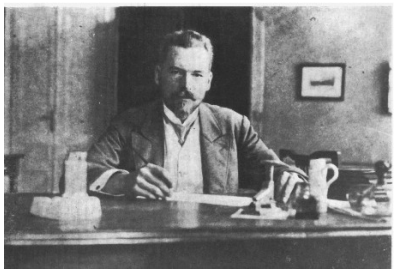

Contribution ID: **35** Type: **poster**

Spin frustration of a mixed spin-1/2 and spin-3/2 Ising model on a decorated square lattice driven by a magnetoelastic coupling

Thursday, 6 September 2018 15:00 (3 hours)

The mixed spin-1/2 and spin-3/2 Ising model on a decorated planar lattice accounting for lattice vibrations of decorating atoms is treated by making use of the canonical coordinate transformation, the decoration-iteration transformation, and the harmonic approximation. It is shown that the magnetoelastic coupling gives rise to an effective single-ion anisotropy and three-site four-spin interaction, which are responsible for the anomalous spin frustration of the decorating spins in virtue of a competition with the equilibrium nearest-neighbor exchange interaction between the nodal and decorating spins. The ground-state and finite-temperature phase diagrams are constructed for the particular case of the mixed spin-1/2 and spin-3/2 Ising model on a decorated square lattice for which thermal dependencies of the spontaneous magnetization and specific heat are also examined in detail. It is evidenced that a sufficiently strong magnetoelastic coupling leads to a peculiar coexistence of the antiferromagnetic long-range order of the nodal spins with the disorder of the decorating spins within the frustrated antiferromagnetic phase. The investigated model displays a variety of temperature dependencies of the total specific heat, which may involve in its magnetic part one logarithmic divergence from the Ising universality class apart from one or two additional round maxima superimposed on a standard thermal dependence of the lattice part of the specific heat.

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Session Classification: Poster session