Contribution ID: **49** Type: **Oral Presentations**

Nonlinear excitation interaction with extended inhomogeneities in anisotropic ferromagnets

The effect of the interaction of nonlinear excitations with extended inhomogeneities in an on-site anisotropic Heisenberg spin chain is probed numerically. Inhomogeneity corresponds to a segment consisting of consecutive spins on the chain that are subjected to an inhomogeneous magnetic field. To describe the behavior of the spin chain, we derive the nonlinear Schrödinger equation (NLS) of the spin amplitude for classical spin vectors and wide nonlinear excitations. For a homogeneous chain with an easy axis anisotropy the NLS possesses a bright soliton solution. It is found that homogeneities with positive coefficients act as a potential barrier and yield transmission or reflection of the incident soliton. When the coefficients are negative, the extended inhomogeneities act as potential wells and for a given range of parameters the interactions exhibit periodically repeating windows of transmissions and trapping as a function of the length of the inhomogeneous segment. The observed scattering patterns have been explained in terms of the frequency and decay analyses of the shape oscillations of the soliton within the inhomogeneity. It is shown that the outgoing soliton follows a resonance between the period of oscillations and the length of the inhomogeneity.

Primary authors: KAMBUROVA, Radostina; PRIMATAROWA, Marina; CHAMATI, Hassan (Institute of Solid State Physics, Bulgarian Academy of Sciences)

Presenter: CHAMATI, Hassan (Institute of Solid State Physics, Bulgarian Academy of Sciences)