Tamm and Shockley states in 1D planar magnonic crystals

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We have investigated spin wave surface states (SSs), localized on the surfaces resulting from the breaking of the periodic structure of 1D planar magnonic crystals (MCs). We have considered (i) MC in an exchange regime with periodic changes of anisotropy field (ii) bi-component MC in dipolar-exchange regime. To implement the symmetry related criteria for existence of the SSs we chose the symmetric unit cell for both systems. We also investigated SSs induced by the presence of perturbation of the surface areas of the MCs. We showed, that the system with modulated anisotropy is a direct analog of the electronic crystal. For SSs existing in MCs in dipolar regime we demonstrated that spin waves preserve distinct differences to the electronic crystals, which are due to long-range dynamic dipolar interactions. We found that tuning of the strength of magnetization pinning resulting from the surface anisotropy or dipolar effect is vitally important for existence of the SSs in MCs. [1]

References:

[1] J. Rychły, J. W. Kłos, 2017, J. Phys. D: Appl. Phys., DOI: 10.1088/1361-6463/aa5ae1

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