

Kinetics of pulse-induced magnon Bose-Einstein condensate

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Abstract

© 2014, EDP Sciences, SIF, Springer-Verlag Berlin Heidelberg. We have analysed the kinetics of Bose-Einstein condensed (BEC) magnons after pulsed excitation in a ferromagnet at room and low temperatures. For this purpose, we have derived the kinetic equations using the nonequilibrium statistical operator method to describe the general form of the interactions in the magnon system. On the basis of this approach, we have analysed the nonlinear properties of the magnon BEC kinetics caused by interactions with magnon reservoir modes and phonons. We have found that formation of a quasi-stationary BEC magnon state is possible not only at room temperature but also at low temperatures, where the magnon-phonon interaction leads to formation of a residual BEC state with magnon population much larger than at room temperature. It was also observed that a moderately strong four-particle part of the magnon-magnon interaction violating the number of magnons is sufficient to facilitate magnon BEC formation. The predicted long-lived magnon BEC state could be promising for realisation of macroscopic qubits.

<http://dx.doi.org/10.1140/epjb/e2014-41028-3>

Keywords

Statistical and Nonlinear Physics