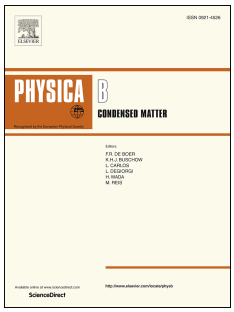
Accepted Manuscript



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PII: S0921-4526(17)30835-9

DOI: 10.1016/j.physb.2017.10.102

Reference: PHYSB 310459

To appear in: *Physica B: Physics of Condensed Matter*

Received Date: 17 September 2017

Accepted Date: 23 October 2017

Please cite this article as: I.F.I. Mikhail, I.M.M. Ismail, M. Ameen, Effect of magnon-phonon interactions on magnon squeezed states in ferromagnets, *Physica B: Physics of Condensed Matter* (2017), doi: 10.1016/j.physb.2017.10.102.

Effect of Magnon-Phonon Interactions on Magnon Squeezed States in Ferromagnets

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Keywords: Ferromagnets, Dressed Magnons, Squeezed States, Magnon-Phonon Interactions.
PACS: 75.10.-b, 75.30.Ds, 75.10.Jm, 75.50.Bb, 63.20.kk.

Abstract

The squeezed states of dressed magnons in ferromagnets have been investigated. No effective Debye cutoff frequency has been assumed unlike what has been done hitherto. Instead, the results have been expressed throughout in terms of the reduced temperature. The effect of dressed magnon-phonon interactions on the formulation of these states has been studied. It has been shown that the magnon-phonon interactions play a significant role in determining the squeeze factor and the variation of the dressed magnon effective mass with temperature.

1 Introduction

The Heisenberg uncertainty principle was postulated in 1927 [1]. Nevertheless, it still stands against any philosophy that may seem to change its concept. It simply states that two incompatible physical quantities whose quantum operators do not commute cannot be simultaneously measured. The discrepancy in the measurements should be greater than a quantity which is proportional to the modulus of their commutator bracket.

In the past three decades squeezing states have been discovered, mainly in optical systems. In these states, the discrepancy in the measurements of one of the two incompatible variables decreases below the limit allowed by the uncertainty principle on the expense that the discrepancy in the other variable increases so that the uncertainty principle remains inviolate.

The squeezing states have first been investigated for photons in models which deal with the interaction of an atom of at least two energy levels

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