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Spin superfluidity in the frustrated two-dimensional anisotropic XY model

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The progress in the investigations of spin supercurrent and magnon BEC was recently described in the review. Particularly, the spin supercurrent Josephson Effect which is the response of the current to the phase between two weakly connected regions of coherent quantum states was overviewed. For quasiparticles such as magnons and excitons in Bose-Einstein condensation (BEC), it demonstrates the interference between two quasiparticles condensates. Spin current as a function of the phase difference across the junction, α1−α2, where α1 and α2 are phases precession in two coherently precessing domains. It is the response of the current to the phase between two weakly connected regions of coherent quantum states\cite{YuM}. It was described by Josephson. We used the SU (3) Schwinger's Boson theory to study the spin transport properties in the two dimensional anisotropic frustrated Heisenberg model in the triangular lattice at T=0. We have investigated the behavior of the spin conductivity for this model which presents a single-ion anisotropy. We studied the spin transport in the Bose-Einstein condensation regime where we have that the tz bosons are condensed and the following condition is valid: <tz>=t. Our results show a metallic spin transport for ω>0 and a superfluid spin transport in the limit of DC conductivity, ω→0, where σ(ω) tends to infinity in this limit of ω.

Biography

Leonardo dos Santos Lima has completed his PhD from Universidade Federal de Minas Gerais, Brazil and Post-doctoral studies from Tecnische Universität Kaiserslautern, Germany. He is Professor of Physics of Departamento de Física e Matemática Centro Federal de Educação Tecnológica de Minas Gerais. He has published more than 25 papers in international journals.

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