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Theory of the spin EPR shift and application to $Pb_{1-x}Mn_xTe$
PRASANTA MISRA, University of Houston, R.K. DAS, Gopalpur College, India, GOURI TRIPATHI, Berhampur University, India — We consider a system with a periodic potential, spin-orbit interaction, conduction electron-local moment interaction and an applied magnetic field. We derive a theory for the spin-contribution to the electron-paramagnetic resonance shift (P_s) by considering an effective equation of motion of the Green's function in a representation defined by the periodic part of the Bloch function. The spin-EPR shift is expressed as a function of the matrix elements of the momentum, Pauli spin-operators, and conduction electron-local moment interactions. We apply the theory to calculate P_s at Mn^{2+} ion in the diluted magnetic semiconductor $Pb_{1-x}Mn_xTe$, as a function of the carrier concentration. Contributions from band-edge interactions as well as from far bands are included and their relative strengths are analyzed. P_s is found to be anisotropic arising mainly due to spin-orbit interactions. Our results of P_s for two typical hole densities agree fairly well with the recent experimental results for p-$Pb_{1-x}Mn_xTe$.

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