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Raman active peaks in heavy fermion systems: a model study of the Coulomb interaction effect in ferromagnetic limit

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Abstract. We report here a model study of Raman spectra in heavy fermion systems in normal state. We consider Periodic Anderson Model along with phonon coupling to hybridization between the conduction and f-electrons as well as phonon coupling to the bare f-electrons and phonon vibrational energy within harmonic approximation. The Coulomb interaction between f-electrons in the ferromagnetic limit, is considered within the Hartee-Fock type mean-field approximation. The phonon Green's function is calculated by using Zubarev's Green's function technique. Phonon spectral density function (SDF) is calculated from the imaginary part of the phonon Green's function applying a small phonon spectral width. The intensity of Raman spectra is proportional to the phonon SDF. The Raman spectra display a bare phonon peak as well as a hybridization gap excitation peak. Evolution of these peaks are investigated by varying the model parameters of the system.

Keywords. Electron-phonon interaction, Raman spectra, Coulomb interaction, Ferromagnetism

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