

Modeling of propagation of synchrotron radiation through a paramagnetic medium of integer spin

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Abstract

Nuclear forward scattering (NFS) of synchrotron radiation (SR) is theoretically modeled into multilevel "gamma-optical" paramagnetic media with effective integer spin ($S=1, 2$) under the electron spin fluctuations in the unclosed electron shell of Moessbauer ion $^{57}\text{Fe}^{4+}$. The equilibrium fluctuations of effective spin is changing the time phase coherence within the total resonant forward scattering amplitude of a gamma-quantum of SR pulse into the Moessbauer nuclei ensemble of a sample. As result the specific temperature dependence of the resonant response of "gamma-optical" paramagnetic medium takes place.

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Keywords

Electron spin fluctuations, Ferrous paramagnetic media, Nuclear forward scattering of synchrotron radiation