Probing the Helical Quadrupolar Order in Ho with Resonant and Non-Resonant X-ray Scattering

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The 4f aspherical charge density satellite peaks in Ho measured by X-ray scattering, initially studied by Keating [1], were investigated both in the spiral antiferromagnetic and ferromagnetic phases at the Brazilian Synchrotron Light Laboratory (LNLS) [2]. Temperature dependences of the 2τ satellite in the planar spiral phase and the τ satellite in the conical phases show the same dependence as the magnetic ordering [3]. Q-dependence of the even satellites evidences the quadrupolar nature of the satellites and is in good agreement with theoretical calculations using the formalism for multipolar scattering with the Stevens equivalent-operator method [4]. Unexpected integrated intensities for the even satellites indicate the effect of the anisotropy of the tensor susceptibility (ATS) on these incommensurately modulated ordering peaks. Resonant X-ray scattering of the satellites at the L_3 edge were also investigated giving indication of interference effects with the extra magnetic satellite peaks appearing at resonance [5].

References

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