SYMMETRY ANALYSIS AND NEUTRON DIFFRACTION OF MAGNETIC STRUCTURES

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9.7 cm

Every magnetic structure may be described by the real, Wannier function defined on the Wyckoff positions of one space group G (parent group) and presented in the set of basic vectors (BV) of irreducible representations (IR)-s of this group. The translation properties of magnetic structures are described by the set of **k**-vectors given in reciprocal space. They are equivalent to diffraction vectors in a neutron diffraction experiment. As the result, the Fourier components included in the magnetic form-factor and refined in the procedure of solving the structure, which may be realized after phase transition, are done as a linear combination of one **k**-vector modes (parts of BV). The given set of Wyckoff positions in G may split on few orbits in $G(\mathbf{k})$. Then structures realized on different orbits are independent. The symmetry analysis gives the complete set of possible model structures, which may be realized after phase transition, the minimal number of different parameters which have to be used in the refinement and the set of independent order parameters.

The results are especially interesting for complicated incommensurate structures, where many models appear as possible, which never was regarded earlier (spirals going by different orbits may have perpendicular plane of rotation, or spiral structure on one orbit may be coupled with sine-modulated structure in the second one).

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