

Crystal symmetry for incommensurate helical and cycloidal modulations

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A classification of magnetic superspace groups compatible with the helical and cycloidal magnetic modulations is presented. Helical modulations are compatible with groups from crystal classes 1, 2, 222, 4, 422, 3, 32, 6 and 622, while cycloidal modulations are compatible with groups from crystal classes 1, 2, m and mm2. For each magnetic crystal class, the directions of the symmetry allowed (non-modulated) net ferromagnetic moment and electric polarization are given. The proposed classification of superspace groups is tested on experimental studies of type-II multiferroics published in the literature.

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