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**Rotation and Metastability of $BiFeO_3$ Domains in a Magnetic Field**[1] RANDY FISHMAN, Oak Ridge National Laboratory, DANIEL FARKAS, SANDOR BORDACS, ISTVAN KEZMARKI, Budapest University of Technology and Economics — Earlier models for the room-temperature multiferroic $BiFeO_3$ assumed that the domain wavevectors **q** are restricted to the three hexagonal axis normal to the static polarization parallel to a cubic diagonal like [1,1,1]. However, increasing evidence suggests that the domain wavevectors rotate so that **q** lies perpendicular to the field orientation **m** for fields above about 9 T. We show that previously neglected hexagonal anisotropy restricts the wavevectors to lie along the hexagonal axis in zero field. For fields below $B_{c1} = 7$ T, the domain with wavevector **q** along **m** remains metastable while the two wavevectors of the other domains rotate perpendicular to **m**. For $B_{c1} < B < B_{c2}$, the domain with wavevector along **m** disappears as it is no longer even metastable. For fields above $B_{c2} = 9$ T, the stable domain has wavector **q** normal to **m**. These new results explain recent measurements of the critical field as a function of field orientation, small-angle neutron scattering measurements of the wavevectors, as well as spectroscopic measurements for field along [0,1,-1].

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Randy Fishman
Oak Ridge National Laboratory

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