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Magnetic field induced transitions in $BiFeO_3$ M. MATSUDA, S. DISSANAYAKE, T. HONG, Quantum Condensed Matter Division, Oak Ridge National Laboratory, W. RATCLIFF II, NIST Center for Neutron Research, NIST, Y. ZHAO, Z. XU, NIST Center for Neutron Research, NIST and Department of Materials Science and Engineering, University of Maryland, S. MIYAHARA, Department of Applied Physics, Fukuoka University, Japan, N. FURUKAWA, Department of Physics and Mathematics, Aoyama Gakuin University, Japan, S. KAWACHI, A. MIYAKE, M. TOKUNAGA, Institute for Solid State Physics, University of Tokyo, Japan — Bulk $BiFeO_3$ exhibits a spiral spin structure below 640 K and also a transition to a canted G-type structure in magnetic field. Very recently, a new magnetic phase was found just below the critical field to the canted G-type phase. [1] Neutron diffraction measurements were performed to clarify the magnetic structure in the intermediate phase as well as the magnetic domain redistribution in magnetic field. There are three magnetic domains with different easy planes at ambient magnetic field. We found that with applying field perpendicular to one of the magnetic domains (M1), the other two domains merge to the M1 domain around 5 T. With further applying field, there occurs a first order magnetic transition to the intermediate phase. The incommensurate peaks observed perpendicular to the magnetic field at low fields become commensurate in the intermediate phase. We will discuss the magnetic structure in this phase. [1] S. Kawachi et al., in preparation. This research at ORNL's HFIR was sponsored by the Scientific User Facilities Division, Office of Basic Energy Sciences, U.S. Department of Energy.

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