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Topological structural defects and a spin-liquid phase in $TbInO_3$[1]

JAE-WOOK KIM, X. WANG, F.-T. HUANG, Y. WANG, X. FANG, Rutgers University, X. LUO, POSTECH, Y. LI, S. MORI, D. KWOK, Rutgers University, VIVIEN ZAPF, Los Alamos National Laboratory, SANG-WOOK CHEONG, Rutgers University — Geometrical frustration can create highly degenerate ground states, complex spin configurations, or exotic ground states. One example is the spin-liquid, where magnetic ordering is suppressed even at zero temperature by quantum fluctuations and may host novel properties such as spinon excitations, majorana edge states, etc. Here, we report an intriguing coexistence of ferroelectric domains and spin-liquid in hexagonal $TbInO_3$. Geometric ferroelectricity is realized by displacement of Tb^{3+} ions and show topological defects with $Z_2 \times Z_3$ domains. At low temperatures, magnetic susceptibility indicates strong in-plane anisotropy without any hysteresis under applied magnetic field. Furthermore, we find no evidence of long range order in specific heat measurement down to temperatures as low as 150 mK suggesting that $TbInO_3$ a spin liquid. Concurrence of topological structural defects and spin-liquid phase in this system provides a unique basis to study intriguing edge states from frustrated magnetism.

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