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Title of the Presentation: Tunable dynamical magnetoelectric effect in antiferromagnetic topological insulator $MnBi_2Te_4$ films

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Short Biography:

Tongshuai Zhu received the B.S. degree in School of Physics from Shandong University, Jinan, China, in 2018. He is currently working toward the Ph.D. degree in School of Physic of Nanjing University, Nanjing, China. He research interests include condensed matter physics.

Abstract:

Axion was postulated as an elementary particle with a low mass and weak interaction in particle physics to solve the strong CP (charge conjugation and parity) puzzle, and later axion was also considered to be a possible component of dark matter in the universe. However, the existence of axions in nature has not been confirmed. Interestingly, axions arise out of pseudoscalar fields derived from the Chern-Simons theory in condensed matter physics. In antiferromagnetic insulators, the axion field can become dynamical due to spin-wave excitations and exhibits rich exotic phenomena, such as the chiral magnetic effect and axionic polariton. However, antiferromagnetic dynamical axion insulator has yet been experimentally identified in realistic materials. Very recently, MnBi2Te4 was discovered to be an antiferromagnetic topological insulator with a quantized static axion field $\theta = \pi$protected by inversion symmetry $P$and magnetic-crystalline symmetry $S = T\tau_{1/2}$, where T is time reversal symmetry and $\tau_{1/2}$ is half translation symmetry. Here, we studied MnBi2Te4 films in which both the P and S symmetries are spontaneously broken and found that substantially tunable dynamical magnetoelectric effects could be realized through tuning the thickness of MnBi2Te4 films, temperature or element substitutions[1].

[1]Zhu et al.arXiv:2010.05424.