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Dynamical Axion Field in a Magnetic Topological Insulator Superlattice¹ JING WANG, BIAO LIAN, SHOU-CHENG ZHANG, Department of Physics, Stanford University — We propose that the dynamical axion field can be realized in a magnetic topological insulator superlattice or a topological paramagnetic insulator. The magnetic fluctuations of these systems produce a pseudoscalar field which has an axionic coupling to the electromagnetic field, and thus it gives a condensed-matter realization of the axion electrodynamics. Compared to the previously proposed dynamical axion materials where a long range antiferromagnetic order is required, the systems proposed here have the advantage that only an uniform magnetization or a paramagnetic state is needed for the dynamic axion. We further propose several experiments to detect such a dynamical axion field.

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