Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Dynamical Axion Field in Topological Magnetic Insulators RUNDONG LI, Stanford University, JING WANG, Tsinghua University, XIAO-LIANG QI, SHOU-CHENG ZHANG, Stanford University — Axions are very light, very weakly interacting particles postulated more than 30 years ago in the context of the Standard Model of particle physics. Their existence could explain the missing dark matter of the universe. However, despite intensive searches, they have yet to be detected. In this work, we show that magnetic fluctuations of topological insulators couple to the electromagnetic fields exactly like the axions, and propose several experiments to detect this dynamical axion field. In particular, we show that the axion coupling enables a nonlinear modulation of the electromagnetic field, leading to attenuated total reflection. We propose a novel optical modulators device based on this principle.

Rundong Li
Stanford University

Date submitted: 16 Nov 2009 Electronic form version 1.4