Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Negative refraction and an optical analogue of a directional spin valve in multiferroic materials KEI SAWADA, RIKEN, SHUICHI MURAKAMI, Tokyo Institute of Technology, NAOTO NAGAOSA, CREST, The University of Tokyo — We present a new mechanism for negative refraction caused by a magneto-electric (ME) effect. The ME effect appears in multiferroic materials in which spatial inversion and time-reversal symmetries are simultaneously broken. Such symmetry breakings allow us to control the spontaneous electric polarization by a magnetic field. We study polaritonic states in multiferroics and show that an asymmetric dispersion relation due to the ME effect gives rise to an optical analogue of a directional spin valve and a one-way waveguide as well as the negative refraction. We also estimate a realistic size of the effect.

Kei Sawada
RIKEN

Date submitted: 27 Nov 2007 Electronic form version 1.4