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Nonreciprocal Directional Dichroism and Toroidal-magnons in Helical Magnets SHIN MIYAHARA, ERATO-MF, JST, NOUBO FURUKAWA, Aoyama Gakuin Univ. — We investigate a dynamical magnetoelectric effect owing to a magnetic resonance in helical spin structures through a coupling between magnetization and electric polarization via a spin current mechanism [1]. We show that the magnon has a dynamical magnetic moment dM and an electric moment dP which is perpendicular to dM , simultaneously, i.e., a dynamical toroidal moment $T^d = dM \times dP$ under the external magnetic fields, and thus named it as a toroidalmagnon. The toroidalmagnon exists in most conical spin structures due to generality of the spin current mechanism. In absorption of electromagnetic wave, the toroidalmagnon excitation process generally induces nonreciprocal directional dichroism as a consequence of an interference of the magnetic and the electric responses. The nonreciprocal directional dichroism should be experimentally observed in various cycloidal multiferroic materials, *e.g.* $R\text{MnO}_3$. [1] H. Katsura, A.V. Balatsky, and N. Nagaosa: Phys. Rev. Lett. **98** 027203 (2007)

Shin Miyahara
ERATO-MF, JST

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