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Directional dichroism of THz radiation in $Sr_2CoSi_2O_7$[1] TOOMAS RÕÕM, U. NAGEL, NICPB, Tallinn, Estonia, V. KOCSIS, D. SZALLER, I. KÉZSMÁRKI, Department of Physics, Budapest University of Technology and Economics, Hungary, Y. TOKUNAGA, Y. TAGUCHI, RIKEN, Wako, Japan, Y. TOKURA, Quantum-Phase Electronics Center and Department of Applied Physics, University of Tokyo, Japan — The microscopic mechanism of magnetoelectric coupling in akermanite-like Co-oxide multiferroics is unique because the local electric polarization mainly arises from the hybridization of Co ion and its ligands orbitals and is less affected by the details of the actual magnetic order of Co spins. As a consequence of this magnetoelectric effect, the spin waves located in the THz range exhibit giant directional dichroism in $Ba_2CoGe_2O_7$ [S. Bordacs et al., Nature Physics **8**, 734 (2012)]. Here we studied spin excitations in a sister compound $Sr_2CoSi_2O_7$ in magnetic fields up to 17 T. We found that the giant directional dichroism at THz frequencies is present below the Neel temperature (T_N) where the spins are ordered antiferromagnetically and persists as well above T_N due to the large uniform magnetization and electric polarization induced by the external magnetic field. The relation of the observed ac magnetoelectric effect to the dc magnetoelectric effect studied by Akaki et al. [Phys. Rev. B **86**, 060413(R) (2012)] is also discussed.

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