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Observation of a huge polaron gyrotropic response near room temperature in manganite thin films. GERVASI HERRANZ, BLAI CASALS, RAFAEL CICHELERO, DAVID PESQUERA, MARIANO CAMPOY, FLORENCIO SANCHEZ, JOSEP FONTCUBERTA, Institut de Cincia de Materials de Barcelona ICMAB-CSIC, Campus UAB, 08193 Bellaterra, Spain, PABLO GARCIA FERNANDEZ, JAVIER JUNQUERA, Dept. Ciencias de la Tierra y Fs. de la Materia Condensada, U.de Cantabria, Av. de los Castros s/n, 39005 Santander, Spain — Magnetic materials induce rotation and ellipticity in the polarization of light. This phenomenon is exploited, e.g., to control the flux of light along optical fibers. In the pursuit for increased magneto-optic responses, strategies so far have been based on photonic or plasmonic effects. Here we uncover a novel physical mechanism by which the gyrotropic activity is hugely enhanced around the Curie temperature in optimally doped ferromagnetic manganites. This phenomenon is observed only for a narrow range of wavelengths and temperatures and is strongly dependent on the angle of incidence and polarization. We understand such an outstanding response as the result of the interplay between Jahn-Teller distortions and spin-orbit coupling in narrow-band manganites. The showcased material is $La_{2/3}Ca_{1/3}MnO_3$, for which the extraordinary gyrotropic response is seen near room temperature. This raises the possibility of optimizing the stoichiometric composition to drive the effect to higher temperatures. The observed phenomenon gives an added functionality –unseen previously in any manganite or other magnetic oxides– and puts a new perspective on the use of these materials for optical data storage and retrieval.

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