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Two-dimensional magneto-optical light modulation in EuTiO3 ANNETTE BUSSMANN-HOLDER, Max-Planck-Institute for Solid State Research, KRYSTIAN ROLEDER, Institute of Physics, University of Silesia, BENJAMIN STUHLHOFER, GENNADY LOGVENOV, ARNDT SIMON, JRGEN KHLER, Max-Planck-Institute for Solid State Research — EuTiO₃ is antiferromagnetic at low temperature, namely below $T_N = 5.7$ K. In the high temperature paramagnetic phase the strongly nonlinear coupling between the lattice and the nomnially silent Eu $4f^7$ spins induces magnetic correlations which become apparent in muon spin rotation experiments [1] and more recently in birefringence measurments [2] in an external magnetic field. It is shown here, that high quality films of insulating $EuTiO_3$ deposited on a thin $SrTiO_3$ substrate are versatile tools for light modulation. The operating temperature is close to room temperature and admits multiple device engineering. By using small magnetic fields the birefringence of the samples can be switched off and on. Similarly, rotation of the sample in the field can modify its birefringence Δn . In addition, Δn can be increased by a factor of 4 in very modest fields with simultaneously enhancing the operating temperature by almost 100K. The results can be understood in terms of paramagnon phonon interaction where spin activity is achieved via the local spin-phonon double-well potential.

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Annette Bussmann-Holder Max-Planck-Institute for Solid State Research

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