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## Directional anisotropy of light in multiferroics

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Multiferroics are materials which exhibit electric and magnetic order simultaneously. Due to the coupling of electric and magnetic effects, these materials show a strong potential to control electricity and magnetism and, more generally, the properties and propagation of light. One of the most fascinating and counter-intuitive recent results in multiferroics is directional anisotropy, the asymmetry of light propagation with respect to the direction of propagation. The absorption in the material can be different for forward and backward propagation of light, which in extreme case may lead to complete suppression of absorption in one direction. Another remarkable effect in multiferroics is directional birefringence, i.e. different velocities of light for different directions of propagation. As an example, in the multiferroic samarium ferroborate giant directional birefringence can be realized. The effect is easily observed for linear polarization of light in the range of millimeter-wavelengths, and survives down to very low frequencies. The dispersion and absorption close to the electromagnon resonance can be controlled and fully suppressed in one direction. Therefore, samarium ferroborate is a universal tool for optical control: with a magnetic field as an external parameter it allows switching between two functionalities: polarization rotation and directional anisotropy.

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