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Manipulation of the polarization of intense laser beams via optical wave mixing in plasmas¹ PIERRE MICHEL, LAURENT DIVOL, DAVID TURNBULL, JOHN MOODY, Lawrence Livermore National Laboratory — When intense laser beams overlap in plasmas, the refractive index modulation created by the beat wave via the ponderomotive force can lead to optical wave mixing phenomena reminiscent of those used in crystals and photorefractive materials. Using a vector analysis, we present a full analytical description of the modification of the polarization state of laser beams crossing at arbitrary angles in a plasma. We show that plasmas can be used to provide full control of the polarization state of a laser beam, and give simple analytical estimates and practical considerations for the design of novel photonics devices such as plasma polarizers and plasma waveplates.

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