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Plasmons of a two-dimensional electron gas with Rashba and Dresselhaus spin-orbit coupling. JESUS A MAYTORENA, CATALINA LOPEZ-BASTIDAS, Centro de Ciencias de la Materia Condensada, UNAM Ensenada, Mexico, ELMER CRUZ, CICESE, CCMC UNAM, Ensenada, Mexico — We calculate the dielectric response of a two-dimensional electron gas with both Rashba and Dresselhaus spin-orbit (SO) coupling within the self-consistent-field approach. We obtain the dispersion relations of the collective modes and the regions of single-particle excitations, related with intra- and inter-spin-split transitions. The interplay of both types of SO couplings give rise to an angular anisotropy of the spin-splitting energy. As consequence, the plasmon spectrum and the Landau damping regions show a dependence on the direction of the wave vector transfer. This response is in contrast to that of vanishing Rashba or Dresselhaus case. We also discuss the dependence of this spectral characteristics on the electron density and SO coupling strengths, and derive expressions for the intra- and inter- SO plasmons in the long-wavelength limit.

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