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Anisotropy of plasmon spectrum due to joint Rashba and Dresselhaus spin-orbit interaction¹ SAMVEL BADALYAN, Department of Radiophysics, Yerevan State University, 375025 Armenia and Department of Physics, University of Regensburg, 93040 Regensburg, Germany, ALEX MATOS-ABIAGUE, Department of Physics, University of Regensburg, 93040 Regensburg, Germany, GIOVANNI VIGNALE, Department of Physics and Astronomy, University of Missouri - Columbia, Missouri 65211, USA, JAROSLAV FABIAN, Department of Physics, University of Regensburg, 93040 Regensburg, Germany — We have investigated the combined effect of Rashba and Dresselhaus spin-orbit interaction (SOI) on the many-body polarization function of a two-dimensional electron system (2DES). The dielectric function of a 2DES is calculated within the random phase approximation and the plasmon energy spectrum as a function of the momentum magnitude for its different orientations is obtained. Our calculations show the peaked behavior of dynamical structure factor as a function of the polar angle of momentum. This strong peak corresponds to the plasmon, which is damped due to SOI. Thus, we have clearly demonstrated that due to the anisotropy of the spin-orbit interaction, the plasmons with the definite values of energy and momentum can be excited only in the certain direction.

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Samvel Badalyan
Dept. of Radiophysics, Yerevan State University, 375025 Armenia and
Dept. of Physics, University of Regensburg, 93040 Regensburg, Germany

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