Fermi polaron longitudinal-transverse and strain-induced splitting in transition-metal dichalcogenides

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The exciton-electron interaction in semiconductors leads to the formation of bound three-particle complexes, trions, whose optical response is conveniently described by a multiparticle Fermi polaron states formed as a result of the correlation of a trion with a Fermi sea hole. The Fermi polaron energy spectrum fine structure in two-dimensional transition metal dichalcogenides has been theoretically studied, and an effective Hamiltonian has been obtained. Symmetric analysis and microscopic calculations have shown that both moving Fermi polarons and Fermi polarons under anisotropic strain are split into linearly polarized states. The source of longitudinal-transverse splitting is the long-range electron-hole exchange interaction, the interaction of Fermi polarons with the electromagnetic field induced by them. The anisotropic splitting is induced by valley mixing, that leads to the mixing of circularly polarized Fermi polarons.