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Fermi polaron-polaritons in MoSe2[1] MEINRAD SIDLER, PATRICK BACK, OVIDIU COTLET, ATAC IMAMOGLU, Institute for Quantum Electronics, ETH Zurich — The truly 2D nature of transition metal dichalcogenides (TMDs) as well as their large electron mass infer strong Coulomb interactions which imply strong exciton binding energies of order 500 meV. The resulting small Bohr radius ensures a strong coupling of the exciton to light. Using a fiber microcavity, we measure cavity spectroscopy of gate-tunable monolayer MoSe2 in the weak as well as in the strong coupling regime. In the weak coupling regime, we observe two resonances whose relative intensities change with the electron density. We find that both resonances show a sizable normal mode splitting which rules out their usual identification as exciton and trion but demonstrates that the elementary optical excitations in this new material system are attractive and repulsive polarons. Our findings completely revamp the current paradigm used to describe the ever-growing number of experiments based on TMD monolayers.

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