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The electron–phonon coupling strength in the spin–split valence band maximum of single-layer MoS2 is studied using angle-resolved photoemission spectroscopy and density functional theory-based calculations. Values of the electron–phonon coupling parameter $\lambda$ are obtained by measuring the linewidth of the spin–split bands as a function of temperature and fitting the data points using a Debye model. The experimental values of $\lambda$ for the upper and lower spin–split bands at K are found to be 0.05 and 0.32, respectively, in excellent agreement with the calculated values for a free-standing single-layer MoS2. The results are discussed in the context of spin and phase-space restricted scattering channels, as reported earlier for single-layer WS2 on Au(111). The fact that the absolute valence band maximum in single-layer MoS2 at K is almost degenerate with the local valence band maximum at $\Gamma$ can potentially be used to tune the strength of the electron–phonon interaction in this material.

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