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Excitonic valley polarization and coherence in atomically thin MoS_2 DONG HAK KIM, DAEYOUNG LIM, Department of Applied Physics, KyungHee University — We study the excitonic valley polarization and coherence in few-layer MoS_2 by circular- and linear-polarization-resolved photoluminescence. The valley polarization is largest in monolayer MoS_2 and decreases with the increase in the number of layers or temperature. Contrary to the valley polarization, the linear polarization is negligibly small in monolayer MoS_2 and increases with the increase in the number of layers or temperature. The valley decoherence in monolayer MoS_2 is at least an order of magnitude faster than the valley depolarization or exciton decay at low temperature, implying it has a pure dephasing origin. The valley coherence is steady against the increase in temperature or photoexcitation intensity, excluding phonon or carrier-carrier scattering from the dominant decoherence process. The temperature dependence of the valley polarization can be explained by the center of mass momentum dependent long range electron-hole exchange interaction, whereas that of the linear polarization may be due to relatively temperature-insensitive valley decoherence.

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