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Intervalley scattering and localization behaviors of group-VI transition metal dichalcogenides HAIZHOU LU, WANG YAO, The University of Hong Kong, DI XIAO, Carnegie Mellon University, SHUN-QING SHEN, The University of Hong Kong — We study the quantum diffusive transport of multi-valley massive Dirac cones coupled by intervalley spin-orbit scattering. We show that the intervalley spin-orbit scattering and intravalley spin-conserved scattering can be distinguished from the quantum conductivity that corrects the semiclassical Drude conductivity, due to their distinct symmetries and localization trends. In immediate practice, it allows transport measurements to estimate the intervalley scattering rate in hole-doped monolayers of group-VI transition metal dichalcogenides (e.g., molybdenum dichalcogenides and tungsten dichalcogenides), an ideal class of materials for valleytronics applications. The results can be generalized to a large class of multi-valley massive Dirac systems where time-reversal symmetry demands opposite spins in opposite valleys.

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