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【114】 Strong inter-valley carrier scattering in high-temperature phase of 1T-TiSe_2 disclosed by optical spectroscopy

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We measured and analyzed the optical response of 1T-TiSe_2 at temperatures above the CDW transition. Separate responses of electron and hole subsystems are identified and followed in temperature. We show that neither semiconductor nor semimetal pictures apply in their generic forms, as the carrier scattering is very strong, with the related energy scale \hbar/τ being of the order of the absolute values of the gap (or indirect band overlap) previously reported. Our analysis indicates that the inter-valley scattering is dominant in the wide temperature range above the transition and directly responsible for the compensation of electron and hole contributions in the Hall coefficient.

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