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Observation of negative terahertz photoconductivity in monolayer MoS_2 under femtosecond laser excitation CHUN HUNG LUI, ALEX J. FRENZEL, DANIEL V. PILON, YI-HSIEN LEE, JING KONG, NUH GEDIK, Massachusetts Institute of Technology — We observed a pronounced transient decrease of terahertz conductivity in doped monolayer molybdenum disulfide (MoS_2) after pulsed laser excitation. This anomalous phenomenon arises from the strong many-body interactions in the system, where optically produced electron-hole pairs join the doped charges to form trions, bound states of two electrons and one hole, and substantially diminish the carrier conductivity by the resulting increase of effective mass. Our results reveal the ultrafast formation and decay of trions in monolayer MoS_2 and their influence on the conductivity of the material.

Chun Hung Lui
Massachusetts Institute of Technology

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