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Broadband Femtosecond Transient Absorption Spectroscopy for CVD MoS_2 monolayer SHROUQ ALEITHAN, Ohio University, MAKSIM LIVSHITS, University of New Mexico, SUDIKSHA KHADKA, Ohio University, JEFFREY RACK, University of New Mexico, MARTIN KORDESCH, ERIC STINAFF, Ohio University — Carrier dynamics in monolayer MoS2 have been investigated using broadband femtosecond transient absorption spectroscopy (FTAS). A tunable pump pulse was used while a probe pulse of white-light continuum over the spectral range of 350 nm - 800 nm revealed ground and excited state carrier dynamics. For MoS_2 we observe previously reported features related to ground state bleaching along with higher energy features that can be related to states identified as the C and D excitons, which have been reported to arise from band nesting. Interestingly, for pump wavelengths both resonant and non-resonant with the A and B excitons, we observe a broad ground state bleach around 2.9 eV, with decay components similar to A and B. Associating this bleach with the band nesting region between K and Gamma in the band structure indicates significant k-space delocalization and overlap among excitonic wave functions identified as A, B, C, and D. Comparison of time dynamics for all features in resonance and non-resonance excitation is consistent with this finding. The results on these dynamics may prove useful to a greater understanding of the electronic structure of this material.

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