Biexciton formation in monolayer MoS2 as observed by transient absorption spectroscopy

EDBERT J. SIE, MIT, YI-HSIEN LEE, National Tsing-Hua University, Taiwan, ALEX J. FRENZEL, JING KONG, NUH GEDIK, MIT — We report on the observation of biexcitons and heterobiexcitons in monolayer MoS2 measured using optical pump and probe spectroscopy. The binding energies of these biexcitons were found to be as large as 35 meV and 60 meV, respectively. This renders the four-particle, or even higher-order, electronic correlations stable against thermal fluctuations at room temperature. These results could serve as a guide for first-principle calculations of high-order electronic correlations in 2D atomic crystals, and to facilitate further investigation toward device applications.

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