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Local electronic structure of charge ordering in monolayer 2H-$TaSe_2$ YI CHEN, UC Berkeley, HYEJIN RYU, LBNL, Pohang University of Science and Technology, HEEJUNG KIM, Pohang University of Science and Technology, HSIN-ZON TSAI, FRANKLIN LIOU, ARASH A. OMRANI, UC Berkeley, CHOONKYU HWANG, Pohang University of Science and Technology, Pusan National University, B.I. MIN, Pohang University of Science and Technology, SUNG-KWAN MO, ZAHID HUSSAIN, LBNL, MICHAEL CROMMIE, UC Berkeley, LBNL — Metallic transition metal dichalcogenides (TMDs) are ideal platforms for exploring collective electronic phases such as charge density wave (CDW) order and superconductivity. Bulk 2H-$TaSe_2$, a well-studied CDW system, is known to undergo an incommensurate CDW transition at T $\approx$ 122K and a commensurate CDW transition at T $\approx$ 90K. Reducing $TaSe_2$ sample thickness to the single-layer limit is expected to affect this behavior due to the absence of inter-layer coupling and the dimensionality effect [1]. Here we present an electronic structure study of single-layer $TaSe_2$ by means of scanning tunneling microscopy/spectroscopy, angle-resolved photoemission spectroscopy, and first-principle simulations. We observe charge ordering in monolayer $TaSe_2$, thus providing new insight into the interplay between charge order and dimensionality in this model CDW system. [1] Miguel M. Ugeda, et.al. Nature Physics 12, 92-97 (2016).

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