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 $T \approx 122$K and a commensurate CDW transition at $T \approx 90$K. 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).