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Dimensionality effect on the charge density wave and superconductivity of molecular beam epitaxy grown monolayer $NbSe_2$ HYEJIN RYU, YI ZHANG, ZAHID HUSSAIN, SUNG-KWAN MO, Advanced Light Source, Lawrence Berkeley National Laboratory, Berkeley, California 94720, USA, Z.-X. SHEN, Geballe Laboratory for Advanced Materials, Departments of Physics and Applied Physics, Stanford University, Stanford, California 94305, USA, MIGUEL M. UGEDA, AARON J. BRADLEY, SEITA ONISHI, YI CHEN, WEI RUAN, CLAUDIA OJEDA-ARISTIZABAL, MARK T. EDMONDS, HSIN-ZON TSAI, ALEXANDER RISS, DUNGHAI LEE, ALEX ZETTL , MICHAEL F. CROMMIE, Department of Physics, University of California at Berkeley, Berkeley, California 94720, USA — Transition metal dichalcogenides are ideal compounds to investigate dimensionality effect since the weak coupling between layers enables to study single-layer material which removes interlayer interactions and introduces quantum confinement. We investigate dimensionality effect of $NbSe_2$ in which the bulk phase shows charge density wave (CDW) (T_{CDW} =33 K) and superconductivity (T_c =7.2 K). We report electronic band structure of MBE grown monolayer $NbSe_2$ measured by Angel-resolved photoemission spectroscopy compared with bulk. We find the number of bands crossing the Fermi energy reduces from three (bulk) to one (monolayer). Based on the significant suppression of superconducting T_c =0.65 K with robust CDW in monolayer $NbSe_2$, our results imply the band remained at the Fermi level in monolayer $NbSe_2$ may play a crucial role in CDW formation and the disappeared bands are possibly in charge of superconductivity.

Hyejin Ryu
Advanced Light Source, Lawrence Berkeley National Laboratory, Berkeley, California 94720, USA

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