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ARPES studies of transition metal dichalcogenides MoS2 and MoSe2[1] GUANG BIAN, NASSER ALIDOUST, SUYANG XU, Department of Physics, Princeton University, RAMAN SANKAR, Center for Condensed Matter Sciences, National Taiwan University, CHANG LIU, ILYA BELOPOLSKI, MADHAB NEUPANE, Department of Physics, Princeton University, J.D. DENLINGER, Advanced Light Source, Lawrence Berkeley National Laboratory, F.C. CHOU, Center for Condensed Matter Sciences, National Taiwan University, M.Z. HASAN, Department of Physics, Princeton University — Transition metal dichalcogenides have attracted much attention recently due to their potential applications in nanoelectronics and photonics, as a result of the desirable changes in their electronic band structure upon moving from the bulk limit to few layers and monolayer limit. Here we report our high resolution angle-resolved photoemission spectroscopy study on MoS2 and MoSe2. We, for the first time, resolve the two distinct bands at the Brillouin zone corner of the bulk MoSe2. By depositing potassium on the cleaved surface of MoSe2, we demonstrate the formation of a nearly free 2D electron gas on top of MoSe2. Moreover, the electronic structure of CVD-grown monolayer MoSe2 is carefully examined by ARPES.

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