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Single Layer Transition Metal Dichalcogenides Transistors[1]
YUHANG JIANG, JINHAI MAO, EVA ANDREI, Rutgers University, Department of Physics and Astronomy, RUTGERS UNIVERSITY, DEPARTMENT OF PHYSICS AND ASTRONOMY TEAM — Single layer Transition Metal Dichalcogenides (TMDs), such as MoS_2, WS_2 and TaS_2, are atomically thin two-dimensional materials with unique electronic properties different from their bulk counterparts. The lack of inversion symmetry, high mass of the components and the 2D geometry lead to strong spin-orbit coupling and to a metal insulator transition (MIT). Recent progressing ultrathin sample preparation and nanodevice fabrication has opened new opportunities to explore the transport properties of these layers for potential applications in nanoelectronics. In particular the ability to gate these samples across the MIT, carries the promise of sharp switching characteristics that defeat the thermodynamically imposed limiton the sub-threshold slope in standard field effect transistors. We will report on the electronic properties of field effect transistors fabricated with monolayer in the TMD family under conditions of extreme doping achieved by ionic liquid gating.

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