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Experimental study of superconductivity in single crystal few-layer $NbSe_2$ and the effect of high electric fields NEAL STALEY, Pennsylvania State University, LINJUN LI, ZHUAN XU, Zhejiang University, China, YING LIU, Pennsylvania State University — There have been many studies on superconducting properties in two dimensional films. However, a detailed study of superconducting properties in the two-dimensional limit when crystallinity is still retained, which will allow the probing of band dependent superconductivity in 2D, has not been performed. Due to concerns over defects in ultra thin films deposited in the usual methods, we use the methods developed in preparing micromechanically exfoliated graphene devices. In these samples the band structure is present while maintaining extremely low defect density. Inspired by this simple process that created single crystal single sheet graphite we fabricated ultra thin single crystalline $NbSe_2$ flakes ranging from single to many sheets as estimated using an optical technique correlated to AFM and Raman spectroscopy measurements. Transport and planar tunnel junction devices were fabricated using standard ebeam lithography techniques. We will also study the behavior of of these devices in high electric fields.

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