Contribution ID: **23** Type: **Poster**

Investigating magnetism in 1T-NbSe2

Wednesday 7 January 2026 09:45 (30 minutes)

$NbSe_2$ is a transition metal dichalcogenide (TMDC) well known for having the highest superconducting transition temperature among all pristine TMDCs. While bulk $NbSe_2$ is only found in its 2H superconducting phase, it has been shown that 1T-$NbSe_2$ can be stabilized on a substrate through molecular beam epitaxy growth, with extremely different properties from the 2H phase. 1T-$NbSe_2$ is not superconducting, but a Mott insulator that exhibits localized magnetic moments as seen through Kondo resonances, and has recently been characterized as a spin liquid. However, no evidence of long-range magnetic order has been shown to date. In this work, we grown mixed phase 2H/1T-$NbSe_2$ thin films on $YAlO_3$ substrates using molecular beam epitaxy. We observe the onset of a sizeable magnetoresistance around 75 K, and a pronounced magnetic hysteresis at low temperatures, implying the existence of a long-range magnetic order. However, muon spin rotation experiments showed no presence of a strong magnetic transition, limiting the possible magnetic volume fraction of the film to be less than ˜5 %.

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Session Classification: Wednesday Coffee Break & Poster

Track Classification: Categories: van der Waals experimental