The discovery of graphene has led to a scientific frenzy in the study of two-dimensional (2D) materials that shows exotic physical properties ultimately leading to real applications. Particularly attractive materials are the transition-metal dichalcogenides (TMDs), due to their van der Waals layered structures and their wide range of material properties. Controlling the material thickness down to the single-atom scale enables tuning of the interacting electronic states and phases and it is thus highly desirable to fabricate high-quality monolayer (ML) TMDs. Vanadium diselenide (VSe$_2$) is a typical TMD material. The VSe$_2$ monolayer is composed of metal V atoms sandwiched between two Se atom, and the Se−V−Se layers are stacked in the (001) direction without lateral displacement forming trigonal (T) phase polytype crystal (figure shown) in the bulk.

Exploring the magnetic properties of vanadium selenium(VSe$_2$) by increasing the layered structure in succession. Check the influence of U parameter and vandewaal correction on the magnetic moment of these structures. Investigating the effect of Co overlay on the density of states at the Fermi level. Exploring the variation of electronic properties on VSe$_2$ bilayer system.