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Exciton spectroscopy in hBN / WSe2 van der Waals heterostructures[1] BERNHARD URBASZEK, GANG WANG, MARCO MANCA, XAVIER MARIE, THIERRY AMAND, CNRS - Toulouse University, TAKASHI TANIGUCHI, KENJI WATANABE, NIMS, Tsukuba, Japan, CEDRIC ROBERT, CNRS - Toulouse University — We perform optical spectroscopy on monolayer (ML) WSe2 encapsulated in hexagonal boron nitride (hBN). Although ML WSe2 samples on Si/SiO2 substrates are widely studied in the literature, conclusive measurements on the excited exciton states and fine structure (2s/2p) are still missing. In high quality hBN / ML WSe2 / hBN samples we measure for the linedwidth of the neutral and charged exciton emission values down to 1.6 meV at T=4K, close to the homogenous limit. This allows us to perform 1 and 2-photon spectroscopy which reveal fine details of the exciton and trion states previously masked by inhomogeneous broadening. We discuss the renormalization of the Coulomb interaction by the change in dielectric environment as compared to ML WSe2 exfoliated directly onto SiO2. In polarization resolved measurements we spectrally separate resonant Raman signals and valley polarization of excitons.

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