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Measurement of Exciton Binding Energy of Monolayer WS_2[1] XI CHEN[2], BAIREN ZHU, XIAODONG CUI, The University of Hong Kong — Excitonic effects are prominent in monolayer crystal of transition metal dichalcogenides (TMDCs) because of spatial confinement and reduced Coulomb screening. Here we use linear differential transmission spectroscopy and two-photon photoluminescence excitation spectroscopy (TP-PLE) to measure the exciton binding energy of monolayer WS_2. Peaks for excitonic absorptions of the direct gap located at K valley of the Brillouin zone and transitions from multiple points near Γ point of the Brillouin zone, as well as trion side band are shown in the linear absorption spectra of WS_2. But there is no gap between distinct excitons and the continuum of the interband transitions. Strong electron-phonon scattering, overlap of excitons around Γ point and the transfer of the oscillator strength from interband continuum to exciton states make it difficult to resolve the electronic interband transition edge even down to 10K. The gap between excited states of the band-edge exciton and the single-particle band is probed by TP-PLE measurements. And the energy difference between 1s exciton and the single-particle gap gives the exciton binding energy of monolayer WS_2 to be about 0.71eV.

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[2]First and second authors listed contribute equally in the work.

Xi Chen
The University of Hong Kong

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