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Interlayer Interaction Effects and Spin-Pseudospin Transfer in 2D $MoSe_2$-WSe_2 Heterostructures[1] JOHN SCHAIBLEY, PASQUAL RIVERA, KYLE SEYLER, University of Washington, HONGYI YU, University of Hong Kong, JIAQIANG YAN, DAVID MANDRUS, Oak Ridge National Laboratory, University of Tennessee, WANG YAO, University of Hong Kong, XIAODONG XU, University of Washington — Heterostructures composed of $MoSe_2$-WSe_2 monolayer semiconductors host spatially indirect interlayer excitons, which are bound states of an electron in the $MoSe_2$ layer and a hole in the WSe_2 layer. Interlayer excitons are observable in photoluminescence experiments as a low energy peak whose spectral position is consistent with the predicted type-II band alignment. The electron and hole which form the interlayer exciton are localized in momentum space valleys that occur at the (K and -K) corners of the Brillouin zone. To probe this interlayer valley physics, we perform two color pump-probe measurements to investigate the interactions between intralayer excitons in the heterostructure, resonantly pumping excitons in one layer and probing excitons in the other layer. We observe evidence of interlayer interaction effects in the nonlinear differential reflection spectra. Polarization dependent spectroscopy reveals evidence of interlayer spin-valley pseudospin transfer.

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