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**Magneto-optics in WSe2 and MoSe2 monolayers**[1] BERNHARD URBASZEK, GANG WANG, LOUIS BOUET, ETIENNE PALLEAU, MAEL VIDAL, XAVIER MARIE, THIERRY AMAND, Toulouse University - CNRS — We perform photoluminescence (PL) experiments at T=4K on $MoSe_2$ and $WSe_2$ in magnetic fields up to 9T applied perpendicular to the monolayer (ML) plane. In both systems the neutral exciton is spectrally well separated from the charged exciton (trion). For both exciton complexes in both systems we observe a clear Zeeman splitting of the order of -2meV at 9T between the $\sigma^+$ and $\sigma^-$ polarized PL components, from the $K^+$ and $K^-$ valley, respectively. The extracted g-factors for both exciton complexes in both materials are of the order of $g \approx -4$. This indicates a dominant contribution from the transition metal valence band $d$-orbitals to the exciton magnetic moment, contributions from the valley magnetic moments are discussed. In ML $MoSe_2$ the exciton valley polarization can be tuned with the magnetic field, independent of the excitation laser polarization. In the investigated ML $WSe_2$ sample the evolution of the valley polarization depends for the trion both on the applied magnetic field and the excitation laser helicity, for the neutral exciton only on the latter. In the absence of optical orientation, the trion polarization amplitude increases linearly with the applied magnetic field, albeit with opposite signs in $MoSe_2$ compared to $WSe_2$.

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