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$\mathbf{k}\cdot\mathbf{p}$ theory for two-dimensional transition metal dichalcogenide semiconductors ANDOR KORMANYOS, GUIDO BURKARD, University of Konstanz — We present $\mathbf{k}\cdot\mathbf{p}$ Hamiltonians (for a review see [1]) parametrised by ab initio density functional theory calculations to describe the dispersion of the valence and conduction bands at their extrema (the K, Q, Γ, and M points of the hexagonal Brillouin zone) in atomic crystals of semiconducting monolayer transition metal dichalcogenides. We review the parametrisation of the essential parts of the $\mathbf{k}\cdot\mathbf{p}$ Hamiltonians for MoS_2, $MoSe_2$, WS_2, and WSe_2, including the spin-splitting and spin-polarisation of the bands We use $\mathbf{k}\cdot\mathbf{p}$ theory to analyse: i) optical transitions in two-dimensional transition metal dichalcogenides over a broad spectral range; ii) to discuss magnetotransport properties of the charge carriers in the K and $-K$ valleys.
[1] A. Kormányos, G. Burkard et al, arXiv:1410.6666

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