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Valleytronics in the moiré of 2D semiconductors

Van der Waals stacking of 2D materials into layered structures is a powerful approach towards designer quantum materials that can combine and extend the exotic properties of the building blocks. Ubiquitous to these vdW structures is the formation of moiré pattern due to the inevitable lattice mismatch and twisting between the layers. For band edge carriers located at the Brillouin zone corners (valleys), the interlayer processes feature sensitive dependence on the atomic registry between the constituting layers, summarized as stacking and valley selection rules. These stacking selection rules lead to the emergence of new valley physics in the spatial variation of local atomic registry in the moiré. We will show some examples on the moiré engineering of electronic, optical and magnetic properties for valley-spintronic controls in semiconducting TMDs bilayers.

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References

- [1] H. Yu, G. Liu, J. Tang, X. Xu & W. Yao, *Science Advances* 3 (2017) e1701696.
- [2] Q. Tong, H. Yu, Q. Zhu, Y. Wang, X. Xu & W. Yao, *Nature Physics* 13 (2017) 356.
- [3] K. Seyler, P. Rivera, H. Yu, N. Wilson, E. Ray, D. Mandrus, J. Yan, W. Yao, X. Xu, *Nature* 567 (2019) 66.
- [4] H. Yu, M.-X. Chen, W. Yao, arXiv:1906.05499