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Control of excitons in multi-layer van der Waals heterostructures

ERICA CALMAN, CHELSEY DOROW, MICHAEL FOGLER, LEONID BUTOV, UC San Diego, SHENG HU, ARTEM MISHCHENKO, ANDRE GEIM, university of manchester — We present experimental studies of excitons in double quantum well van der Waals heterostructures composed of atomically thin layers of MoS₂ and hBN. We showed the control of emission of neutral and charged excitons by gate voltage, temperature, and both the helicity and the power of optical excitation [1]. We also observed low-energy emission line with orders of magnitude longer lifetime and energy controlled by voltage. We interpret this line in terms of the recombination of electrons and holes spatially separated in the direction perpendicular to the quantum well plane along which the electric field is applied. [1] E. V. Calman, C. J. Dorow, M. M. Fogler, L. V. Butov, S. Hu, A. Mishchenko, A. K. Geim. Appl. Phys. Lett. 108, 101901 (2016)

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