Abstract Submitted
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Photocurrents and Electroluminescence at gate-defined edges in monolayer p–n junctions[1] ERIK LENFERINK, NATHANIEL STERN, Department of Physics and Astronomy, Northwestern University, KENJI WATANABE, TAKASHI TANIGUCHI, National Institute for Materials Science — Charge carriers in single layer transition metal dichalcogenides (TMDs) possess coupled spin and valley degrees of freedom arising from strong spin-orbit coupling and the absence of inversion symmetry. The valley-contrasting Berry curvature and magnetic moment of these carriers enables valley currents to be created with circularly polarized light and measured electrically. However, due to a high binding energy, excitons only efficiently dissociate into free carriers in the depletion region of metal contacts, strongly impacting coupled spin, valley, and charge dynamics. To overcome this difficulty, we utilize electrostatic gating to define artificial edges with large electric field changes far from metal-semiconductor boundaries[2]. We explore the spatially-resolved photocurrent and electroluminescence properties of dual-gated WSe_2 p–n junctions in a geometry enabling detection of transverse and longitudinal currents and discuss applications of this geometry to measuring valley-polarized opto-electronic processes of electrons and holes.

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[2]B. W. H. Baugher, H. O. H. Churchill, Y. Yang, and P. Jarillo-Herrero. *Nature Nanotech.*, **39**, 262267 (2014).

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