

Abstract Submitted
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Optical generation and detection of pure valley current in monolayer transition metal dichalcogenides¹ WENYU SHAN, JIANHUI ZHOU, DI XIAO, Department of Physics, Carnegie Mellon University — Recent years have seen a surge of interest in the manipulation of the valley index of Bloch electrons, largely driven by its potential applications as valleytronics. Transition metal dichalcogenides are new types of two-dimensional materials with spin-valley coupling, and show some promise as a realization of valleytronics. In this work, we propose a practical scheme to generate a pure valley current in monolayer transition metal dichalcogenides by one-photon absorption of linearly polarized light. We show that the pure valley current can be detected by either photoluminescence measurements or the ultrafast pump-probe technique. Our method, together with the previously demonstrated generation of valley polarization, opens up the exciting possibility of ultrafast optical-only manipulation of the valley index. The tilted field effect on the valley current in experiment is also discussed.

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