

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Valley pump and beam splitting by a potential well on a monolayer hexagonal crystal¹ WEIYUAN TU, WANG YAO, University of Hong Kong — We investigate the possibilities of realizing two distinct valleytronic functionalities in a single device by tuning an insitu controllable parameter, without changing the architecture of the system. We show that by means of a twodimensional pnp junction or a lateral heterojunction formed in a monolayer, two kinds of valleytronic functions can be realized by just changing the band alignment at the junction for both transition metal dichalcogenides and graphene. With shallow potential well, valley beam splitting is observed. Deepening the potential well by the applied gate voltages, we find highly polarized valley flow over a large range of outgoing angles. We further reveal that intervalley population transfer, whose importance can be adjusted by the gate potential, plays a crucial role in manifesting these interesting functionalities. These properties are maintained for armchair oriented junction interface as well as other chiral orientations.

¹The work is supported by the Research Grant Council of HKSAR and the Croucher Foundation

WeiYuan Tu
University of Hong Kong

Date submitted: 10 Nov 2016

Electronic form version 1.4