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Valley beam splitter device based on giant lateral shift in strained Graphene NEETU AGRAWAL, Indian Institute of Tecnnology - Delhi, MANISH SHARMA, SANKALPA GHOSH, Indian Institute of Technology - Delhi — The prospect of strain engineering to control electronic properties has opened up new directions for graphene research. Strain essentially can be considered as a perturbation to the in-plane hopping amplitude, which induces a gauge potential in the effective Hamiltonian which has opposite signs in the two valleys. Thus, strain can induce a valley-dependent magnetic field. We investigate the combined effect of commensurate scalar and vector potentials on a pair of region of uniform uniaxial strain. The strained region induces opposite gauge potentials leading to a valley dependence of the transverse velocity of incident valley unpolarised beam, while quasibound states arising due to well formation between the double unit structure give rise to giant lateral shifts. Thus lateral displacement of transmitted beams from K and $K^{'}$ valleys together with their difference can be enhanced to a very large extent thereby enabling a highly efficient valley beam splitting. The wide tunability of proposed device is facilitated due to the presence of external vector potential. This vector potential acts in a similar way at the two valleys, thereby providing a handle to manipulate the net effect of strain.

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