

Abstract Submitted
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Valley contrasting physics in graphene: magnetic moment and topological transport QIAN NIU, DI XIAO, WANG YAO, The University of Texas at Austin — We investigate physical properties that can be used to distinguish the valley degree of freedom in graphene systems with broken inversion symmetry. We show that the pseudospin associated with the valley index of carriers has an intrinsic magnetic moment, in close analogy with the Bohr magneton for the electron spin. There is also a valley dependent Berry phase effect that can result in a valley contrasting Hall transport, with carriers in different valleys turning into opposite directions transverse to an in-plane electric field. These effects can be used to generate and detect valley polarization by magnetic and electric means, forming the basis for the so-called valleytronics applications.

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