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Transport Properties of Topological 1D Zero-Line Mode in Graphene ZHENHUA QIAO, University of Science and Technology of China, Hefei, Anhui 230026, China, JEIL JUNG, National University of Singapore, Singapore, CHUNGWEI LIN, ALLAN MACDONALD, QIAN NIU, University of Texas at Austin, Austin, Texas 78712, USA — When the inversion symmetry of graphene systems is broken, e.g. graphene subjected to a staggered sublattice potential or bilayer under an applied interlayer potential difference, a bulk band gap opens to support the quantum valley-Hall state. When the potential varies spatially, a topological one-dimensional conducting channel is formed along the zero-line of the potential. We find that such a state shows the property of zero bend resistance. And if two straight zero lines crosses, we show that the splitting of the zero line mode obeys a counterintuitive current partition law. We provide a theory to understand the physics behind these novel characteristics.

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