

Abstract Submitted
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Nonlocal spin-confinement of electrons in graphene with proximity exchange interaction YEE SIN ANG, SHI-JUN LIANG, KELVIN J. A. OOI, Singapore University of Technology and Design, CHAO ZHANG, University of Wollongong, ZHONGSHUI MA, Peking University, LAY KEE ANG, Singapore University of Technology and Design — In graphene-magnetic-insulator hybrid structure such as graphene-Europium-oxide (EuO-G), proximity induced exchange interaction opens up a spin-dependent bandgap and spin splitting in the Dirac band. We study the bound state formation in a hetero-interface composed of EuO-G. We theoretically predict a remarkable nonlocal spin-confinement effect in EuO-G and show that spin-polarized quasi-1D electron interface state can be generated in a magnetic-field-free channel. Quasiparticle transport mediated by the interface state can be efficiently controlled by the channel width and electrostatic gating. Our results suggest a pathway to further reduce the dimensionality of graphene quasiparticles from 2D to 1D, thus offering an exciting graphene-based platform for the search of exotic 1D physics and spintronic applications.

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