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Edge pseudo-magnetoplasmons ALESSANDRO PRINCIPI, MIKHAIL KATSNELSON, Radboud University, institute for Molecules and Materials, NL-6525 AJ Nijmegen, The Netherlands, GIOVANNI VIGNALE, Department of Physics and Astronomy, University of Missouri, Columbia, Missouri 65211, USA — We study the properties of edge plasmons in two-component electron liquids in the presence of pseudomagnetic fields, which have opposite signs for the two different electronic populations and therefore preserve the time-reversal symmetry. The physical realizations of such systems are many. We discuss the case of strained graphene, solving the problem with the Wiener-Hopf technique. We show (i) that two charged counter-propagating acoustic edge modes exist at the boundary and (ii) that, in the limit of large pseudomagnetic fields, each of them involves oscillations of only one of the two electronic components. We suggest that the edge pseudo-magnetoplasmons of graphene can be used to selectively address the electrons of one specific valley, a feature relevant for the emerging field of valleytronics. We speculate that electrons in proximity to a Skyrmion lattice could exhibit the same phenomenology, and that the resulting spin-polarized plasmons at the boundary of Skyrmion lattices could be exploited for spintronics applications. Our solution highlights new features missing in previous (similar) results obtained with uncontrolled approximations, namely a logarithmic divergence of the plasmon velocity, and the absence of gapped edge modes inside the bulk-plasmon gap.

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