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Correlated random hopping disorder in graphene at high magnetic fields: Landau level broadening and localization properties ANA L.C. PEREIRA, Universidade Estadual de Campinas, CAIO H. LEWENKOPF, Universidade Federal Fluminense, EDUARDO R. MUCCIOLO, University of Central Florida — Disorder is key to understand the electronic transport properties in graphene, particularly in the quantum Hall regime. There is still some debate on the most relevant disorder mechanisms for transport in graphene. Among those, ripple disorder is believed to play an important role. Static ripples give rise to random correlated hopping disorder, which is the disorder mechanism analyzed in this work. We study the density of states and localization properties of the lowest Landau levels of graphene at high magnetic fields, focusing on the effects caused by correlated long-range hopping disorder. We find that the broadening of the lowest Landau level shrinks exponentially with increasing disorder correlation length. The broadening also grows linearly with magnetic field and with disorder amplitudes. More importantly, we observe that the ratio between the n=1 and n=0 Landau level widths depends only on the correlation length and is rather insensitive to the disorder strength and to the magnitude of the magnetic field. This allows a closer contact of our results with experiments. In addition, the lowest Landau level peak shows a robust splitting (inferred from the analysis of the participation ratio), whose origin we identify as the breaking of the sublattice (valley) degeneracy.

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