Abstract Submitted
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Stable bound states of like charges on top of graphene in magnetic field[1] SERGEY SLIZOVSKIY, Loughborough University — We show theoretically that in the external magnetic field like charges on top of graphene monolayer may be mutually attracted to form thermodinamically stable macro-molecules. For this to happen graphene needs to be in Quantum Hall plateau state with local chemical potential being between the Landau levels. Graphene electron(s) gets localized in the middle between charges and provides overscreening of Coulomb repulsion between the charges. The size of the resulting macro-molecules is of the order of the magnetic length ($\sim$ 10 nm for magnetic field 10 T). The possible stable macro-molecules that unit charges can form on graphene in magnetic field are classified. The binding survives significant temperatures, exceeding mobility barriers for many ionically bond impurities. The influence of possible lattice-scale effects of valley-mixing are discussed. Tuning the doping of graphene or the magnetic field, the binding of impurities can be turned on and off and the macro-molecule size may be tuned. This opens the perspective to nanoscopic manipulation of ions on graphene by using magnetic field and gating.

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