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Excitonic supersolid in quantum Hall graphene bilayers[1] YOGESH JOGLEKAR, Indiana University- Purdue University Indianapolis (IUPUI), CHANG-HUA ZHANG, Kansas State University — We study the ground state of two graphene sheets separated by a distance d in the quantum Hall regime where the top layer has electrons and the bottom layer has holes as carriers. We obtain a rich mean-field phase diagram as a function of distance d and the partial filling factor $\nu_e = \nu_h = \nu$ for different Landau levels. We find that the ground state in high Landau levels at large d is a generalized Wigner crystal that includes anisotropic stripe and bubble states, and at small d the ground state is a uniform excitonic condensate. We show that for a wide range of partial filling factors $0 \leq \nu \leq 1/2$, at intermediate values of d, the ground state has interlayer phase coherence as well as a lattice structure, i.e. it is an excitonic supersolid. We discuss the predictions for signatures of such a state in transport and optical experiments.

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Yogesh Joglekar
IUPUI

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