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BKT transition for bilayer graphene-based granular superconductors FRANCESCO MANCARELLA, Nordita, JONAS FRANSSON, Uppsala University, ALEXANDER BALATSKY, Nordita, NORDITA - CONDENSED MATTER COLLABORATION, UPPSALA UNIVERSITY- MATERIALS THEORY COLLABORATION — We discuss a BKT phase transition for alkali-doped bilayer graphene (BLG) in the dilute-doping limit, and its dependence on the doping concentration and the stacking of the two graphene sheets, as on external conditions affecting the electronic properties, such as an applied transverse electric field, or different strains exerted on the lattice. A Lang-Firsov transformation of the coupling between impurities vibronic modes and graphite electrons reveals an effective local attractive pairing between electrons. A self-consistent gap equation for BLG with intercalated impurities is then solved. We discuss the conditions for the onset of a granular superconductivity within the film, made possible by Josephson currents flowing between negative U-centers. To ensure phase coherence over the 2D sample, we assume a random 2D distribution of impurities intercalating the BLG sheets, analyzed using a Green function approach. The tunable gate-voltage induced band gap of BLG affects the asymptotic decay of the "Josephson coupling - distance" characteristic for each pair of SC puddles in the sample, which results in the end in a qualitatively strong field-dependence of the relation between BKT transition critical temperature and gate-voltage.

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