

Abstract Submitted  
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**Mesoscopic fluctuations of the critical current in graphene-based Josephson junctions** MAURICIO PILO-PAIS, Duke University, IVAN BORZENETS, University of Tokyo, ULAS COSKUN, Duke University, ALEX SMIRNOV, North Carolina State University, GLEB FINKELSTEIN, Duke University — We study the critical current  $I_C$  and the normal resistance  $R_N$  in superconductor-graphene-superconductor (SGS) Josephson junctions. We observe large (close to 100%) and highly reproducible fluctuations of critical current over small scale changes in  $V_{\text{gate}}$ . Unlike fluctuations of critical current previously seen in 1D nano-wires, the fluctuations in graphene do not necessarily track the small scale changes in normal resistance. We attribute these fluctuations to the disordered nature of our wide graphene junctions, where the critical current may be dominated by a few regions, different from those regions which determine the normal resistance.

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