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Switching and retrapping behavior in graphene proximity-effect superconducting junctions MATTHEW BRENNER, ULAS COSKUN, ALEXEY BEZRYADIN, University of Illinois Physics — Since the pioneering work by R. Holm and W.Meissner [Z. Physik. 86, 787 (1933)], who observed zero resistance in SNS pressed contacts, many manifestations of the superconducting proximity effect have been reported. Recently it was shown that when closely spaced superconducting leads are placed on graphene, the proximity effect is induced and a supercurrent can flow between the electrodes. Here we fabricate graphene proximity-effect junctions (GPJ) and compare them to Josephson junctions (JJ). As the bias current is increased to near the critical current, a thermal escape from the washboard potential can occur driving the junction into the runaway voltage state. The standard deviation of the switching current is measured as a function of temperature and compared to the thermal and quantum escape models for JJs. We find that the temperature dependence of the standard deviation of switching currents of graphene proximity junctions is qualitatively different from the well-studied behavior of the insulator-based JJs. Possible reasons will be discussed.

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