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Sub-Kelvin lateral thermal transport in graphene with superconducting contacts ANNE DRAELOS, AVERY SILVERMAN, JIYINGMEI WANG, CHUNG-TING KE, MING-TSO WEI, Duke University, IVAN VLASSIOUK, Oak Ridge National Laboratory, FRANCOIS AMET, Appalachian State University, GLEB FINKELSTEIN, Duke University — We studied thermal transport in graphene with superconducting contacts at low temperatures, $\sim$0.1 to 3 K, below the Bloch-Grüneisen temperature. The lead (Pb) superconducting electrodes placed along the length of the graphene form a thermal barrier by preventing the outflow of hot electrons, thus allowing us to isolate and study other cooling pathways. We were able to observe a lateral thermal gradient by studying strips (5 x 50 μm) of CVD-grown graphene transferred onto a SiO_2 substrate. The characteristic length scale of the temperature profile is determined by the competition of the lateral heat flow within the electron system versus the local cooling of electrons by phonon emission. We anticipate extending this measurement in the near future to examine the outstanding question of electron-phonon cooling close to the Dirac point.

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