Abstract Submitted
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Absence of zero-energy surface bound states in $Cu_xBi_2Se_3$ via a study of Andreev reflection spectroscopy[1] HAIBING PENG, DEBTANU DE, BING LV, FENGYAN WEI, CHING-WU CHU, Department of Physics and the Texas Center for Superconductivity, University of Houston — $Cu_xBi_2Se_3$ has been proposed as a potential topological superconductor characterized by an odd-parity full bulk superconducting gap and zero-energy surface Andreev bound states (Majorana fermions). A predicted consequence of such Majorana fermions is a peak in the zero-energy density of states which should lead to a persistent zero-bias-conductance-peak (ZBCP) in Andreev reflection (AR) or tunneling experiments. Here we employ a newly developed nanoscale AR spectroscopy method to study normal metal/superconductor (N-S) devices featuring $Cu_xBi_2Se_3$. The results show that a ZBCP can be tuned in or out from $Cu_xBi_2Se_3$ samples depending on the N-S barrier strength. While the appearance of ZBCP may be traced to different origins, its absence under finite barrier strength represents the absence of zero-energy Majorana fermions. The present observations thus call for a reexamination of the intriguing superconductivity in $Cu_xBi_2Se_3$.

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Haibing Peng
Department of Physics and the Texas Center for Superconductivity,
University of Houston

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