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New Excitation at the Interface between High-Temperature Superconductors and Topological Insulators PARISA ZAREAPOUR, ALEX HAYAT, SHU YANG FRANK ZHAO, MICHAEL KRESHCHUK, YONG KIAT LEE, ANJAN REIJNDERS, ACHINT JAIN, Department of Physics and Institute for Optical Sciences, University of Toronto, ZHIJUN XU, ALINA YANG, G.D. GU, Brookhaven National Laboratory, SHUANG JIA, ROBERT CAVA, Department of Chemistry, Princeton University, KENNETH BURCH, Department of Physics and Institute for Optical Sciences, University of Toronto — There has been an increased interest in the interplay between d-wave superconducting order parameter and helical surface states of a topological insulator, due to the recent theoretical proposals predicting the emergence of novel excitations at these interfaces. Motivated by these intriguing proposals, we fabricated high-temperature superconductor/topological insulator junctions by the mechanical bonding method [1]. We report the observation of a zero-bias conductance peak (ZBCP) at temperatures below the critical temperature of the bulk superconductor. The ZBCP in our data indicates the emergence of a new excitation in our devices. I will present a detailed study of the differential conductance measurement of our samples at various temperatures and magnetic fields.

[1] P. Zareapour, et al., Nature Communications 3, 1056 (2012).

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