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Large superconducting double-gap, a pronounced pseudogap and evidence for proximity-induced topological superconductivity in the $Bi_2Te_3/Fe_{1+y}Te$ interfacial superconductor[1] J. Y. SHEN, M. Q. HE, Q. L. HE, K. T. LAW, I. K. SOU, R. LORTZ, Department of Physics, Hong Kong University of Science and Technology, A. P. PETROVIC, School of Physical and Mathematical Sciences, Nanyang Technological University — We investigate directional point-contact spectroscopy on a Bi_2Te_3/ $Fe_{1+y}Te$ heterostructure, fabricated via van der Waals epitaxy, which is interfacial superconducting with an onset T_C at 12K and zero resistance below 8K. A large superconducting twin-gap structure is seen down to 0.27K, together with a zero bias conductance peak. The anisotropic smaller gap (Δ_1) is around 5 meV at 0.27K and closes at 8K, while the other one (Δ_2), as large as 12 meV, is isotropic and eventually evolves into a pseudogap closing at 40K. Both, the two-gap BTK and Dynes models can well reproduce our data, demonstrating Δ_1 should be associated with the proximity-induced superconductivity in the topological Bi_2Te_3 layer, while Δ_2 may be attributed to an intrinsically-doped FeTe thin film at the interface.

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Junying Shen
Department of Physics, Hong Kong University of Science and Technology

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