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Observation of multiple superconducting gaps in $\mathbf{Fe_{1+y}Se_xTe_{1-x}}$ through Andreev reflection DEBTANU DE, CARLOS DIAZ-PINTO, ZHENG WU, PEI-HERNG HOR, HAIBING PENG, Department of Physics and Texas Center for Superconductivity, University of Houston — Iron-based superconductors have been under intensive study because of the high transition temperature and the intriguing physical mechanisms involving the superconductivity and magnetic orders. Theoretical studies on the role of spin fluctuation suggest unconventional S wave pairing and multiple superconducting (SC) gaps due to the five disjoint Fermi surfaces. However, this multiple SC-gap scenario has yet to be confirmed in experiments. Here we report the experimental observation of five SC gaps in $Fe_{1+y}Se_xTe_{1-x}$ from Andreev reflection spectra, along with negative differential conductance dips due to the pair breaking related to the largest SC gap. The evolution of the multiple SC gaps is further investigated as a function of both temperature and magnetic field. For the largest SC gap, the Andreev reflection signal persists above bulk Tc, suggesting the existence of phase incoherent Cooper pairs.

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