

Abstract Submitted  
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**Observation of a subgap density of states in superconductor-normal-metal bilayers in the Cooper limit**<sup>1</sup> ZHENYI LONG, M.D. STEWART, JR., JAMES M. VALLES, JR., Department of Physics, Brown University, Providence, RI 02912 — We have performed transport and tunneling measurements of ultrathin bilayer films that are composed of a superconductor (Pb) and a normal metal (Ag). With Pb thickness fixed, the bilayer superconducting transition temperature and energy gap decrease exponentially with increasing Ag thickness. Simultaneously, an unexpected density of states (DOS) that increases linearly with energy from the Fermi energy appears within the subgap region. The temperature dependence of the subgap DOS also exhibits deviations from mean field theory expectations. We attribute the subgap states to quasiparticles that become trapped on integrable trajectories in the metal layer. The hybrid superconductor-normal-metal character in the DOS might be a sign of a novel superconductor to metal transition in 2 dimensional electronic systems.

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