Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

**Spectroscopy of Andreev Bound States: revealing the hidden side of the Josephson effect** ÇAĞLAR GIRIT, LANDRY BRETHEAU, HUGUES POTHIER, DANIEL ESTEVE, CRISTIAN URBINA, Groupe quantronique CEA Saclay — The Josephson effect describes how phase coherence is established between two weakly coupled superconductors. Microscopically, the Josephson current is carried by Cooper pairs, occupying Andreev Bound States, localized at the weak link. Andreev Bound States, which come in particle-hole symmetric pairs, consitute a spin-like degree of freedom. In our experiment, we detect the transition to the *excited* Andreev bound state in a superconducting atomic contact using a Josephson junction as a broadband (5-90 GHz) spectrometer. Not only do we clearly resolve the Andreev transition, but we also identify spectroscopic lines arising from anticrossings with a Josephson plasma mode of the environment. Our results demonstrate the accessibility of a pseudospin degree of freedom in the Josephson effect.

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Date submitted: 20 Dec 2012 Electronic form version 1.4