Andreev Spectroscopy on the Heavy Fermion Superconductor CeCoIn$_5$*

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Recently, several unconventional pairing characteristics have been reported in the heavy fermion superconductor CeCoIn$_5$. First, there is evidence for $k$-space nodes in the superconducting order parameter (OP). Second, there is also evidence for a field-induced Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) state$^2$,$^3$, with the OP acquiring either real-space nodes or finite momentum. Andreev reflection provides a direct, spectroscopic means for probing these unconventional pairing states, because it is inherently sensitive to the phase, amplitude and momentum of the OP. We present an Andreev spectroscopy study of CeCoIn$_5$, using point-contact junctions on single-crystal samples measured down to 150 mK in temperature and up to 12 Tesla in field. The data is analyzed with the generalized Blonder-Tinkham-Klapwijk formalism$^4$, for spectroscopic evidence on both $d$-wave pairing symmetry and the FFLO state.

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