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| Title: | Transport spectroscopy on trapped superconducting nano-islands of Pb: signature of unconventional pairing |
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| Abstract: | Elemental bulk lead (Pb) is a conventional type I, spin-singlet (s-wave) superconductor with a critical temperature Tc = 7.2 K and a critical magnetic field Hc = 800 Oe. However, it is known that at mesoscopic length scales, like in point-contact geometries, Pb shows significantly higher critical field, sometimes up to several Tesla. We have used this property to trap a small superconducting nano-droplet of Pb by forming a metallic point contact on Pb and then applying a magnetic field larger than 800 Oe that drives the bulk of the material non-superconducting. From systematic magnetic field dependent behaviour of the point-contact spectra measured across such a trapped island of Pb we show that the superconducting order parameter of mesoscopic Pb mixes non-trivially with magnetic field possibly due to the emergence of a local spin-triplet component at such length scales. From comparative studies with Nb-based point contacts we surmise that the strong spin–orbit coupling in Pb leads to the emergence of the unconventional component in the order parameter of mesoscopic Pb. |
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