NEW PARADIGM FOR TRIPLET SUPERCONDUCTIVITY

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Since 1980 more than 10 or so triplet superconductors have been discovered. These are put into two different classes. Type A triplet superconductors consist of $(TMTSF)_2PF_6$, $(TMTSF)_2ClO_4$, UPt_3, Sr_2RuO_4, $PrOs_4Sb_{12}$ etc. These triplet superconductors are known to have extremely small spin orbit coupling energy $E_{so} << \Delta$ (where Δ is the superconducting energy gap). The superconducting order parameter is characterized by **l** (the chiral vector) and **d** (the spin vector) similar to the superfluid $^3He - A$. In these superconductors an Abrikosov's vortex splits into a pair of half quantum vortices(HQVs) at low temperatures (say at $T < T_C/3$). Another class of triplet superconductors appear in noncentrosymmetric crystals. We call them type A_1 in analogy to superfluid $^3He-A_1$. Type A_1 triplet superconductors comprise $CePt_3Si$, $CeIrSi_3$, $CeRhSi_3$, Li_2Pt_3B etc. They are characterized by an enormous spin orbit coupling energy $\sim 10^3K$. In such a case the Fermi surface splits into the one for up-spin and another for down-spin in agreement with Frigeri et al. However contrary to Frigeri et al., the superconductivity resides only for one spin component (say up spin), while the other spin component remains the normal state. Also an Abrikosov's vortex cannot splits into a pair of HQVs. All these triplet superconductors haber Majorana fermion or the zero mode attached to an Abrikosov's votex, of which implication deserves clearly further study.