(7a3)

Angle–resolved specific heat measurements on $PrOs_4Sb_{12}$.

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Angular dependent measurements of the thermal conductivity of the heavy fermion superconductor PrOs4Sb_{12} revealed two distinct superconducting (SC) states separated by phase line $H_{2f\text{-}4f}$ [1]. The lower phase B, i. e. , $H < H_{2f\text{-}4f}$, appears to have a two–fold symmetry of the SC gap, while the upper phase A is of four–fold nature. Here, we present measurements of the angle–resolved specific heat in various magnetic fields. Two samples of different quality were measured in order to check the reproducibility of the results and to estimate the influence of sample dependencies. Fig. 1 shows the results of sample #1 ($m = 86.9$ mg). Exemplarily two runs are shown. The upper panel of Fig. 1(a) is a measurement performed in the B–phase ($H = 5$ kOe $< H_{2f\text{-}4f}$) and the lower panel presents a run ($H = 12$ kOe) in the A–phase of the SC state. Clearly, in the entire SC state a four–fold oscillation in the angular dependence of the specific heat is observed. Experiments on the same sample but now with the field applied in the *yz*–plane exhibit equal behavior. From this we conclude that the SC gap structure of $PrOs_4Sb_{12}$ has 6 point nodes oriented along the [100], [010] and [001] direction. Figure 1(b) shows the behavior of the oscillation amplitude $\boldsymbol{j}A_1\boldsymbol{j}$ as a function of H/H_{c2} ($H_{c2} = 21$ kOe) obtained by fitting the data with $C(T = 0.31\text{K}, H, \phi) = C(0,0) + C(H,0)\,(1 + \boldsymbol{j}A_1\boldsymbol{j}\cos 4\phi)$. Noteworthy, although $\boldsymbol{j}A_1\boldsymbol{j}$ decreases in low fields it remains finite for H ! 0. In addition we observe two other features. A sharp drop in $\boldsymbol{j}A_1\boldsymbol{j}$ indicating the second SC transition at H^* [2] and the existence of a four–fold oscillation in the normal state for $H < 30$ kOe.

[1] K. Izawa *et al.,* Phys. Rev. Lett. **90,** 117001 (2003).
[2] T. Tayama *et al.,* J. Phys. Soc. Jpn. **72,** 1516 (2003).

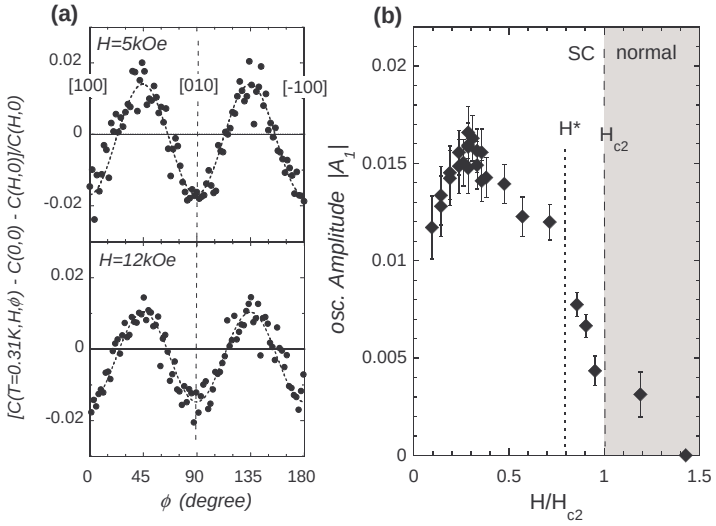

Figure 1: **(a)** Angular dependence of the oscillating part of $C(T, H, \phi)$ measured in the *xy*–plane at $T = 0.31$ K. The dashed line is a fit. **(b)** Evolution of the amplitude $\boldsymbol{j}A_1\boldsymbol{j}$ vs H/H_{c2}. Shaded area represents the normal state of $PrOs_4Sb_{12}$. The second SC transtion is marked by H^*.