

## Magnetic Excitations in the Heavy-Fermion Superconductor $\text{PrOs}_4\text{Sb}_{12}$

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The magnetic excitations in a single crystal of the heavy-fermion superconductor  $\text{PrOs}_4\text{Sb}_{12}$  have been studied by inelastic neutron scattering (INS) at low temperatures and under high magnetic fields. The crystal field (CF) excitations at 0.7 meV reported by the previous INS study of the polycrystal sample were confirmed in this study on a single crystal. The observed excitations in zero magnetic field soften around a wave vector  $(1,0,0)$ , which is the modulation vector of the field-induced antiferro-quadrupolar ordering, suggesting the presence of the quadrupolar instability. Based on the simple CF calculation, the proposed CF level schemes, *i.e.* the singlet ground state model and the non-Kramers doublet ground state models, were examined. The observed field dependence of excitations is better reproduced in the singlet ground state model. In the high resolution experiment, furthermore, the change of the excitation spectra at  $(1,0,0)$  was observed on passing through the superconducting transition temperature, indicating that the magnetic excitation and the superconductivity is closely related in  $\text{PrOs}_4\text{Sb}_{12}$ .

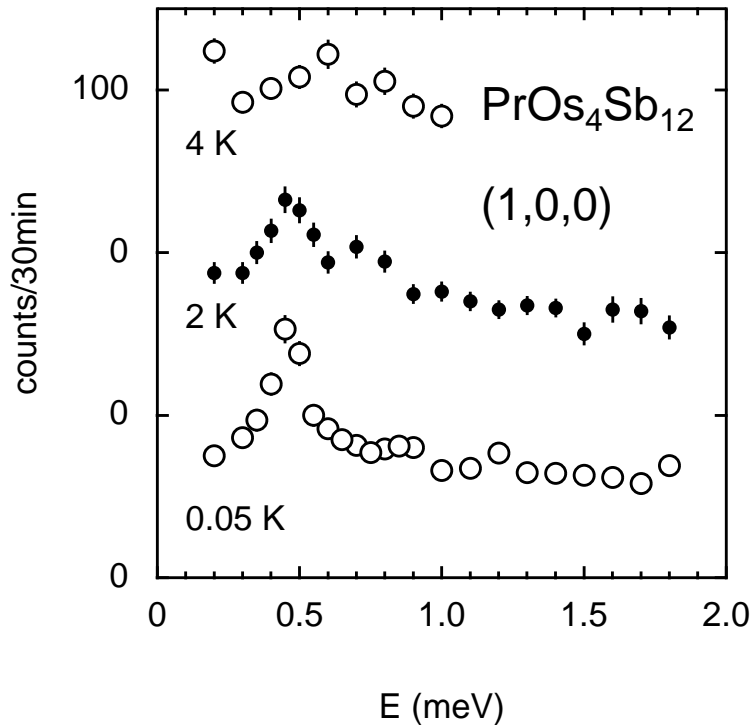


Figure 1: Energy spectra of excitations in  $\text{PrOs}_4\text{Sb}_{12}$  with  $(1,0,0)$  at 0.05 K, 2 K and 4 K in zero magnetic field.