



	Experiment title: One dimensional charge ordering of Yb₄As₃	Experiment number: HE-587
Beamline: ID11	Date of experiment: from: 12.5.99 to:16.5.99	Date of report: 27.8.99
Shifts: 12	Local contact(s): Gavin Vaughan	<i>Received at ESRF:</i>
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Report:

Yb₄As₃ is a member of a new class of materials exhibiting the Kondo effect, which is believed to be based on the screening of localized magnetic moments (4f) by the conduction electrons, with very low carrier density. In addition, it exhibits a first order structural phase transition from a cubic to a trigonal phase at 285K, which is proposed to be accompanied by a 1-dimensional charge ordering. Simultaneously, the room temperature metallic behavior becomes semiconducting below this phase transition.

We performed anomalous diffraction on a single crystal and on polycrystalline material at various temperatures. In particular, we investigated reflections for which the contributions from the two different sublattices (Yb²⁺/Yb³⁺) are expected to cancel when the charge is randomly distributed. This is indeed the case for the 30-3 reflection, which was not observed at room temperatures, but which was clearly observed below the phase transition (Fig. 1). The occurrence of this reflection is directly related to the 1-dimensional charge density wave, since it is sensitive to the difference of the scattering length of the Yb ions on the different sublattices.

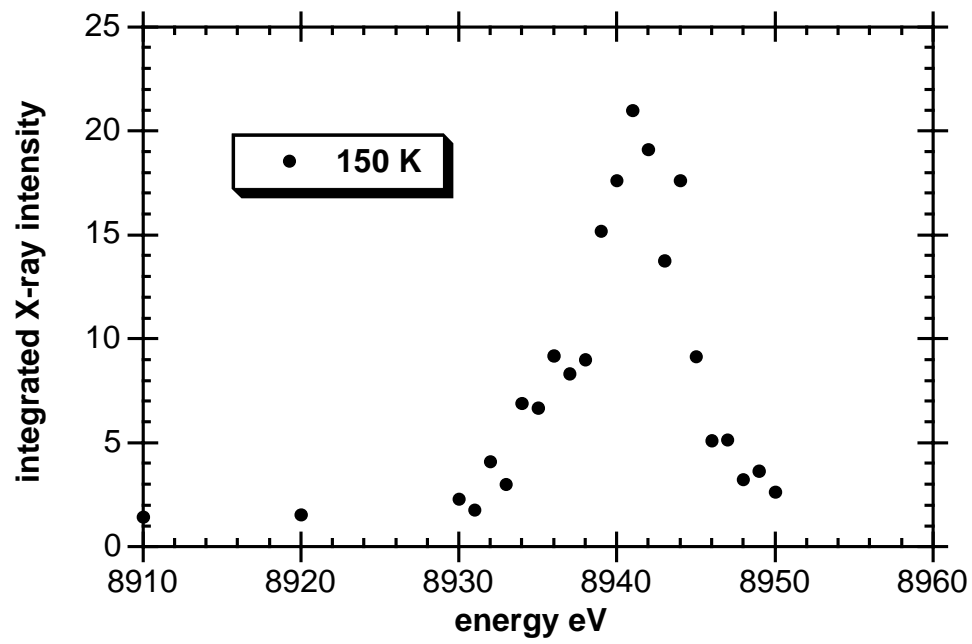


Fig. 1 Energy dependence of the 30-3 reflection in the Yb L₃ near edge region.