



	Experiment title: Pressure-induced α - γ phase transition in mixed-valence Ce: a RIXS study	Experiment number: HE-639
Beamline: ID12A	Date of experiment: from: 24 Oct. 99 to: 6 Nov. 99	Date of report: 27-8-00
Shifts: 28	Local contact(s): Andrei Rogalev	<i>Received at ESRF:</i>
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Report:

Some mechanical changes had been made to the x-ray spectrometer installed on beamline ID12A by the Laboratoire de Chimie Physique for these high-pressure experiments. This was to improve the vertical stability of the sample holder and also to improve resolving power since it was planned to focus the beam onto the sample through the thin Be gasket of the pressure cell.

We started off with some standard measurements to test the spectrometer but encountered some technical problems with the high-pressure cell which had not been used previously under high vacuum. While attempts were made to solve the problems, we carried on with tuning the spectrometer and examining new samples. Finally it was found that work on the cell would leave too little time to finalize the high-pressure experiments and the whole of the beamtime was used for measurements on Ce intermetallics under normal conditions.

Thus, apart from the time spent making improvements in the experimental set-up, we were able to make some detailed measurements on CeCuSi and CePd₃ which have rather similar *L*-edge absorption spectra. In fact CeCuSi is very much γ -like, while CePd₃ is α -like. We had chosen these particular samples to make comparisons with the two phases of elemental Ce. Some of the data collected for CeCuSi and CePd₃ are shown in Figs 1 and 2 respectively. The *2p3d* RIXS curves (from bottom to top) are shown as a function of increasing incident photon energy. Several interesting observations can be made.

- 1) The structure attributed to quadrupole transitions, vary as a function of incident photon energy in significantly different ways.
- 2) A feature is observed to develop on the low energy side of the x-ray emission when the incident photon energy increases above the white line energy in CePd₃. This is due to the $4f^0$ component of the ground state.

- 3) Both types of sample, despite their delocalized ($5d6s$) valence states, show structure to the high-energy side as the incident photon energy increases above the main resonance. Its dispersion as a function of energy is the signature of a strong Raman effect in competition with the x-ray fluorescence decay.

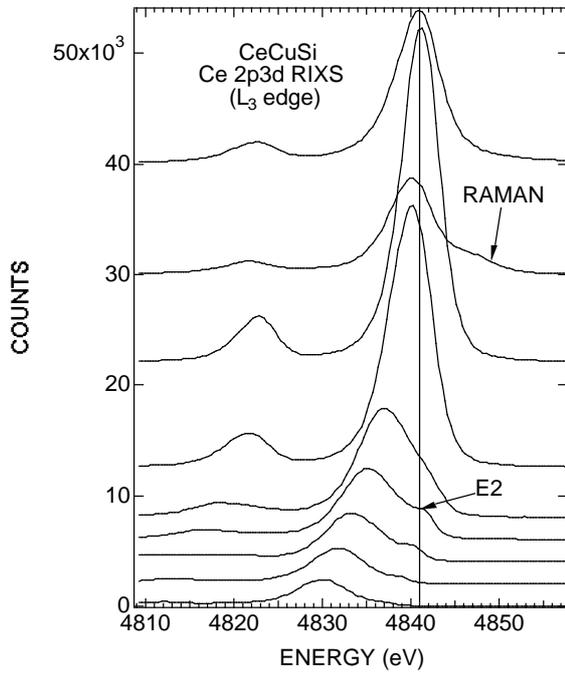


Fig. 1

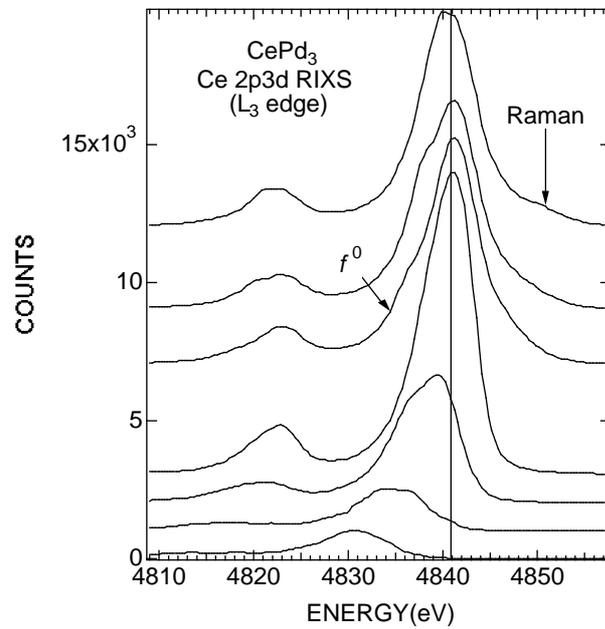


Fig. 2