ESRF	**Experiment title:** Study of γ-like Cerium compounds by x-ray resonant Raman scattering at the M_5 threshold with final 4p-hole.	**Experiment number:** HE-983
Beamline: ID08	**Date of experiment:** from: 8/6/2001 to: 12/6/2001	**Date of report:** 27/2/2002
Shifts: 12	**Local contact(s):** A. Tagliaferri	*Received at ESRF:*

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The experiment we performed is different from what announced by the experiment title: in fact it had been seen in a test-run that, contrary to expectation, inner-shell RIXS spectra of γ-like Cerium compounds did not show differences for different degrees of hybridization.
We therefore decided to turn to the measurement of the linear dichroism effect in valence RIXS spectra of Cerium at the M_5 treshold. The experiment was performed on several α-like and γ-like Ce compounds and it was found that the size of the dichroic effect is related to the hybridization in the ground state.

The paper is on print on Solid State Communication. We hereafter report the abstract and selected figures.

Study of bulk ground state properties of Cerium intermetallics by linear dichroism in 4f Resonant Inelastic X-ray Scattering

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We have measured polarization effects in 4f Resonant Inelastic X-Ray Scattering in the M_5 region of intermetallic compounds of Cerium ($CeRh_2$, $CePd_3$, Ce_7Rh_3, $CeAl_2$). The experiment was performed using linearly polarized radiation with direction either perpendicular or parallel to the scattering plane. The dichroic effect is strong and depends on the degree of hybridization of the compound. We show that there is a monotonous relationship between the measured dichroism integrated along the emitted energies, and the radius of the Cerium ion in the different compounds. Since the atomic size of Cerium is directly related to its valence, we conclude that linear dichroism in inelastic x-ray scattering is a bulk-sensitive indicator of the relative weight of the $4f^0$ and $4f^1$ ground state configurations of Cerium compounds.

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Selected figures from the paper:

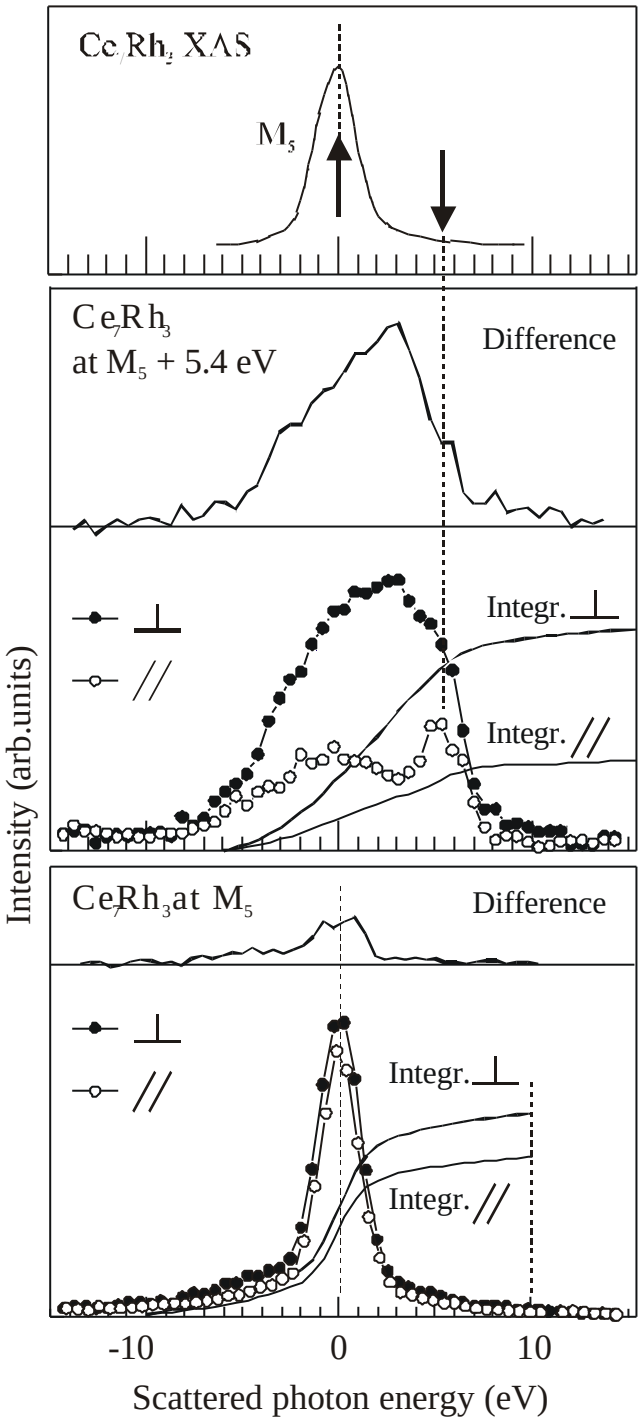

Fig. 2

Figure 2. X-Ray Linear Dichroism spectra of Ce_7Rh_3. Upper panel: XAS spectrum taken in the Total Electron Yield mode (identical for both polarizations), the arrows indicate the energies at which the scattering spectra were excited. Lower two panels: RIXS spectra excited at the M_5 resonance and 5.4 eV above the resonance. Spectra with filled and hollow dots are excited with polarization normal and parallel to the scattering plane, the thin line is the difference. The scattered energy values are given relative to the elastic M_5 peak. The thin and thick lines superimposed to the RIXS spectra are the integrated spectral values for parallel and perpendicular polarization.

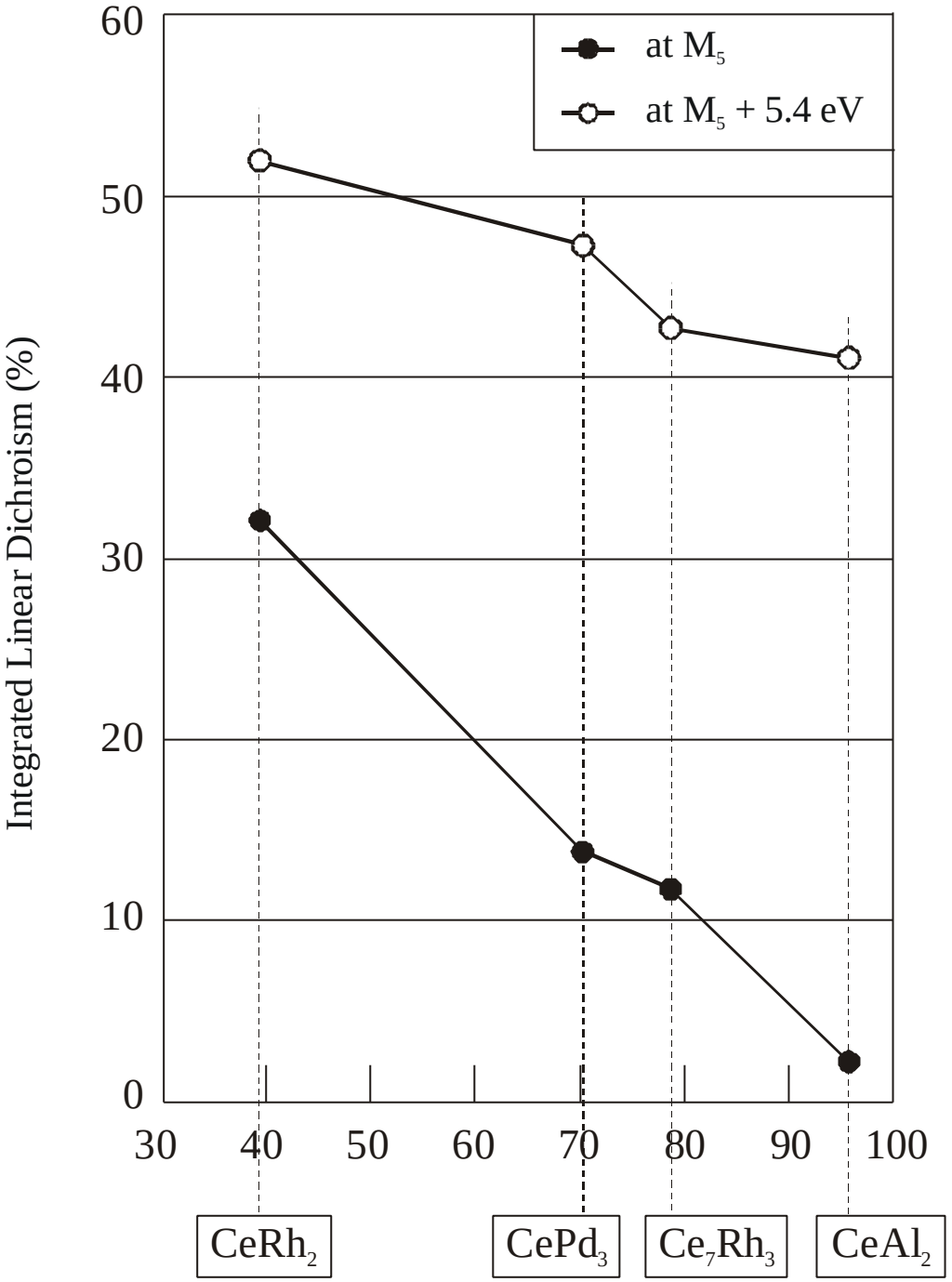

Fig. 5

Figure 5. Integrated dichroism of Cerium intermetallic compounds plotted vs. Ce atomic radius. The dichroism is calculated as the difference between the integrals of the spectra with different polarizations, normalized to their sum. On the horizontal scale the size of the Ce atom is plotted in percentage unit between the two extreme values of CeO_2 and CeF_3.