X-ray Study of the Valence Transition of $CeOs_4Sb_{12}$ in Pulsed Magnetic Fields

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Valence transitions, where *f* electrons undergo a transformation from quasi-localised to itinerant, are associated with a change in unit cell volume. Perhaps the most famous and dramatic example of this is the $\gamma - \alpha$ transition in cerium and its alloys, which for elemental cerium is accompanied by an isostructural collapse of the unit cell volume often reported to be as large as ~15 % [1]. The Ce-based compound $CeOs_4Sb_{12}$ has previously been shown using resistivity, magnetostriction, and contactless conductivity (PDO) measurements to undergo a valence transition from the high-temperature, high-field $\mathcal{H}$-phase to the low-temperature, low-field $\mathcal{L}$-phase with a very unusually-shaped phase boundary [2, 3]. In this seminar I will discuss the results of single-crystal x-ray diffraction measurements in pulsed magnetic fields of up to 30 T performed to study this valence transition at a microscopic level. We observe a field-induced change of the lattice parameter associated with the transition from the $\mathcal{L}$-phase to the $\mathcal{H}$-phase and in addition to this we identify a small distortion from the previously reported cubic structure. The observation of both of these subtle effects is only possible due to the high sensitivity of the backscattering geometry used.

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