ESRF	**Experiment title:** EXAFS investigation of the metal to insulator tendency in solid Rb and Cs at high pressures	**Experiment number**: HC-1020
Beamline: BM23	**Date of experiment**: from: 26 Feb 2014 to: 2 Mar 2014	**Date of report**: 1 Mar 2015
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Report:

We have investigated the local and electronic structure of solid Rubidium by means of x-ray absorption spectroscopy (XAS) up to 101.0 GPa, thus doubling the maximum investigated experimental pressure. This study confirms the predicted stability of phase VI and was completed by the combination of two pivotal instrumental solutions. On one side we made use of nanocrystalline diamond anvils, which, contrary to the more commonly used single crystal diamond anvils, do not generate sharp Bragg peaks (glitches) at specific energies that spoil the weak fine structure oscillations in the x-ray absorption cross section. Secondly, we exploited the performance of a state- of-the-art x-ray focussing device yielding a beam spot size of $5 \times 5\ \mu m^2$, spatially stable over the entire energy scan. An advanced data analysis protocol was implemented to extract the pressure dependence of the structural parameters in phase VI of solid Rb from 51.2 GPa up to the highest pressure. A continuous reduction of the nearest neighbour distances was observed, reaching about 6% over the probed pressure range. The results of this work were just submitted for publication [1].

In Fig.1 we report the raw experimental XAS spectra obtained on solid Rb-VI over a large energy range around its K edge at about 15.209 keV. The energy resolution is 0.1 eV. Thanks to the use of nanocrystaline diamonds there are no spurious glitches over the whole energy range. In the left panel of Fig. 2 we show the experimental XAFS oscillations (points) reduced from the raw data at various pressures of Rb-VI, up to 101.0 GPa, together with the corresponding fit (continuous red line). In the right panel, we present the corresponding pair correlation functions g(R) as obtained by the fitting procedure of the XAFS data at various pressure. The vertical bars are the crystallographic coordination shells calculated for the Rb-

VI phase at 48 GPa. Pressure increases from bottom to top: 51.2 GPa, 55.2 GPa, 60.3 GPa, 66.0 GPa, 74.7 GPa, 85.5 GPa, 94.0 GPa and 101.0 GPa. XAFS oscillation trend is mirrored in the continuous sharpening and shifting of the g(R) peaks to smaller distances.

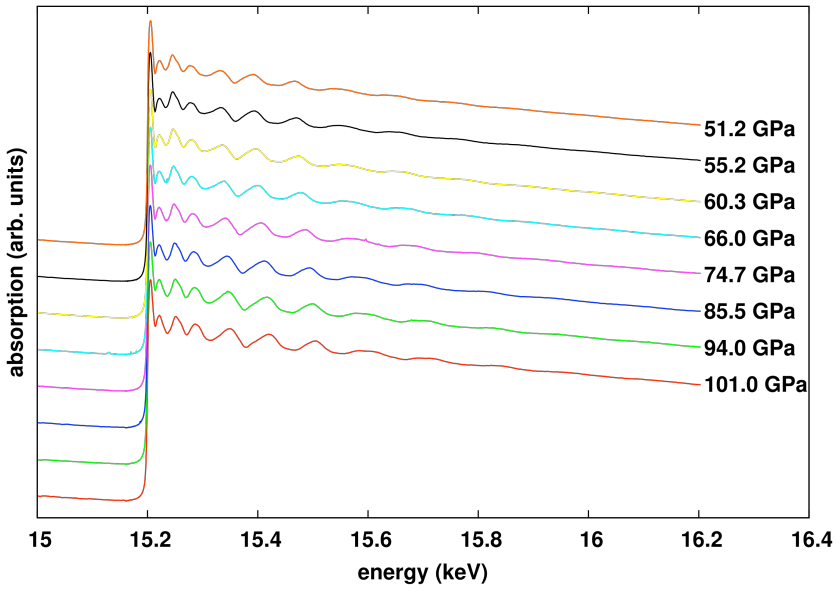

Fig. 1

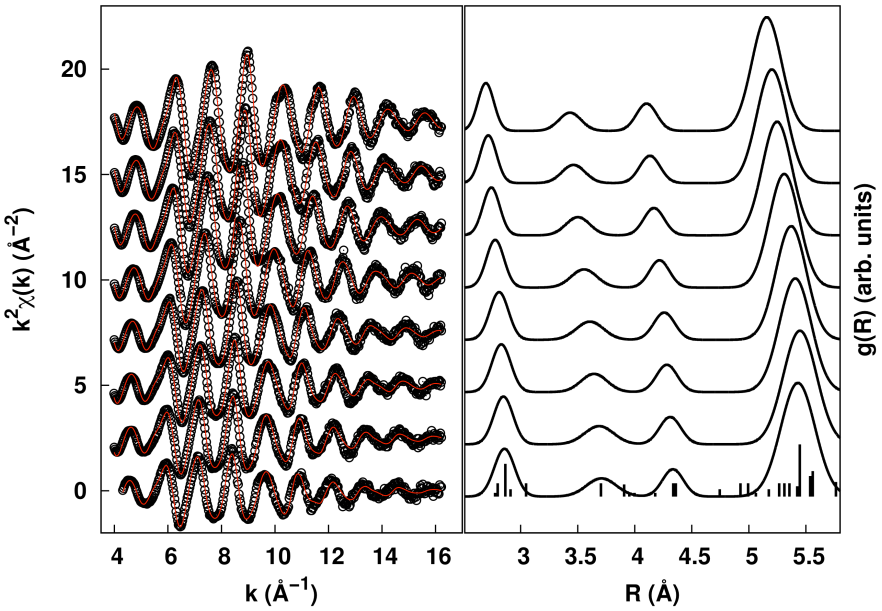

Fig. 2

[1] S. De Panfilis et al., submitted (2015).