



**Experiment title:** Measurement of momentum space densities of  $\text{Cu}_{1-x}\text{Al}_x$  by means of high resolution Compton scattering

**Experiment number:**  
HC 584

**Beamline:**

BL 25

**Date of Experiment:**

from: 17.6.1995 to: 24.6.1995

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**Shifts:**

18

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*Received at ESRF:*

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## Report:

Compton scattering spectroscopy yields information about the one-dimensional projection  $J(p_z)$  of the electron density in momentum space. The measurement of directional Compton profiles for many different directions of the momentum transfer  $\vec{q}$  provides the possibility of a full 3-dimensional reconstruction of the electron momentum density.

We have performed Compton profile measurements for single-crystal  $\text{Cu}_{0.953}\text{Al}_{0.047}$  for 10 different directions of  $\vec{q}$  at the scanning Compton spectrometer of the high energy inelastic scattering beamline BL 25. We scanned 550 data points per spectrum in an energy range from 40.5 – 58.8 keV at an incident photon energy of 58.1 keV. The integral number of counts per spectrum is approximately  $1 \times 10^7$ .

One part of the Compton profiles ( $-2.5 \text{ a.u.} \leq p_z \leq -1 \text{ a.u.}$ ) is spoiled by a parasitic (551) reflection of the analyzer crystal.

Unfortunately, the new setup of the single crystal monochromator at BL 25, which was used under full heat load conditions for the first time, didn't show an improvement of the incident flux at sample position.

Evaluation of the obtained data with the goal to reconstruct the 3D electron momentum density using the Fourier-Bessel-method is in progress.

Figure 1 shows representative examples for the directional anisotropy of the Compton profiles of  $\text{Cu}_{0.953}\text{Al}_{0.047}$ .

Measurements of directional Compton profiles of pure Cu will be performed in October 1996 at the same beamline.

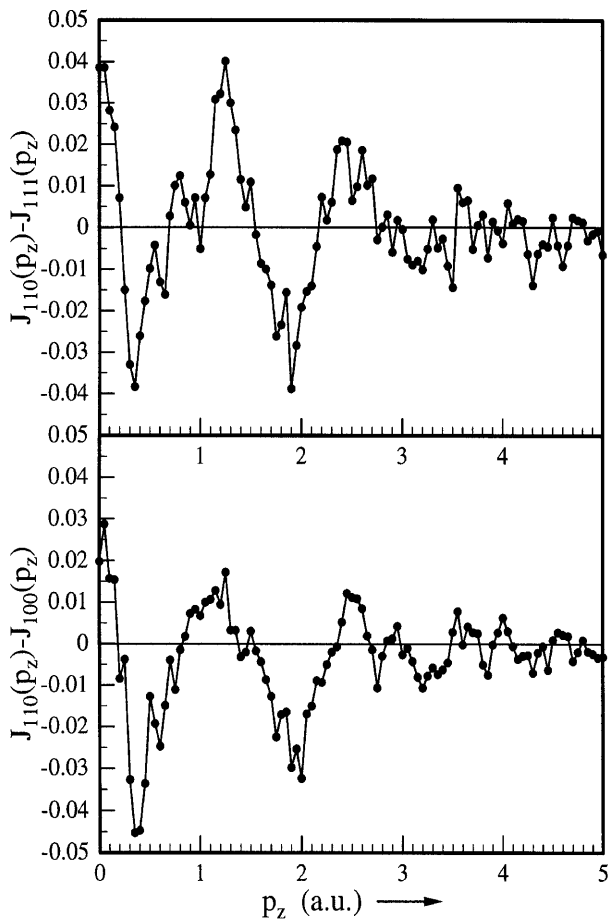


Fig. 1:

Directional Compton profile differences for  $\text{Cu}_{0.953}\text{Al}_{0.047}$

top:  $J_{110}(p_z) - J_{111}(p_z)$

bottom:  $J_{110}(p_z) - J_{100}(p_z)$