



<b>Experiment title:</b> Ultra-high resolution Compton scattering study on Be	<b>Experiment number:</b> HE-1794	
<b>Beamline:</b> ID16	<b>Date of experiment:</b> from: 22.10.2004                      to: 29.10.2004	<b>Date of report:</b> 01.03.2008  <i>Received at ESRF:</i>
<b>Shifts:</b> 18	<b>Local contact(s):</b> Simo Huotari	
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Report:

The results of the experiment have been published in S. Huotari, C. Sternemann, M. Volmer, J. A. Soininen, G. Monaco, and W. Schlke: *High-resolution Compton line shapes: Fermi break of beryllium*, Phys. Rev. B 76, 235106 (2007).

Abstract:

The Be[110] Compton profile was measured with high resolution utilizing x rays with energy of 16 keV. The momentum resolution due to the experimental factors was set to 0.018 atomic units of momentum (a.u.). Electron final-state effects were estimated to have an approximate broadening effect of the spectral features equivalent to 0.028 a.u., resulting in a total momentum resolution of 0.033 a.u., i.e., more than a factor of 2 better than in previous Compton scattering studies. In this way, it was possible to study the ground-state momentum density of the electrons in metallic beryllium with a very high accuracy. As a result, the Fermi-surface-related fine structure is well observed in the experimental Compton profile and its derivative. However, the observed features are broader and less pronounced than anticipated by theoretical estimates. The remaining difference may be due to a non-negligible ground-state correlation and its effects on the momentum density and the Fermi surface of beryllium metal.

