ESRF	**Experiment title:** High-resolution Compton Scattering study of 1T-$TiTe_2$	**Experiment number:** HE-164
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Report:

The aim of the experiment was to obtain Compton profiles along two high symmetry directions of 1T-$TiTe_2$ (IA along the c-axis perpendicular to the surface and ΓM parallel to the surface) to determine the position of the Fermi break and to look for the anisotropy of the Fermi surface.

Because of the natural size of these samples (they are plate-like with a thickness of 0.12 mm in the present case) and the high absorption the experiment was demanding with respect to the achievable statistical accuracy. In order to match defined crystallographic directions with the scattering vector we had to reduce the beam height from the standard 6.0 mm to 3.5 mm given by the shape of the available samples. With these constraints using an incident energy of 55.8 keV and a scattering angle of 160” we obtained an average countrate of 220 counts/sec at the Compton peak resulting in a total peak-countrate of $4.8x10^4$ and $1.2x10^5$ for the TA- and the m-direction, respectively. To obtain reasonable statistics we finally concentrated on the direction ΓM which should be the more interesting one when comparing with photoemission data.

After a standard treatment of corrections including absorption, analyser reflectivity and analyser acceptance a linear background was subtracted from the data. With the achieved statistical accuracy of 0.46% for the TA- and 0.29% for the TM-direction no clear conclusion could be drawn from the difference profile which should show the anisotropy of this quasi twodimensional compound and from the first derivative which should show features of a Fermi break.

The outcome of this experiment is clearly limited by two aspects related to the nature of the sample: the high absorption and the size of the sample. Regarding the sample size an improvement is difficult because so far there is no possibility to grow crystals of that type in a size which is required for a specific experiment. One solution to increase the thickness could be to build a stack of different prealigned single crystals. However, the availability of sufficiently large single crystals is limited. To overcome the countrate limitation by absorption present in materials with large Z even higher incident energies than 55.8 keV used for this experiment are needed (for the moment the setup used for this experiment provides the highest reachable incident energy). This would require the development of a new analyser/monochromator setup for the scanning Compton spectrometer which is planned for the future and could than provide incident energies of ~100keV. With this a much wider range of experiments will become feasable.