

The cover picture illustrates the principle of X-ray spectroscopy of heavy ions interacting with matter and shows results in the form of a characteristic spectrum

In the upper part of the picture the principle of X-ray spectroscopy for investigation of the stopping process of heavy ions in matter is shown. This approach is based on the analysis of the characteristic radiation of swift heavy ions induced in collision with target atoms. The spectra are registered with high spectral and spatial resolution along the ion beam stopping path (see also this report pages 1 and 2).

In the lower part of the picture the characteristic radiation of Ca-ions slowing down in porous SiO<sub>2</sub> media is shown. The relative line intensities in the spectrum reflect the ion charge state distribution. The velocities of ions moving with one tenth of the speed of light can be analyzed using the relativistic Doppler Effect. The Doppler line shift is decreasing continuously with the ion penetration depth in the target material. The lines in the spectrum are tilted demonstrating the ion deceleration process. This feature was used to measure the velocity dynamics of Mg-, Ar-, Ti- and Ca-projectiles over 80% of the ion stopping path.