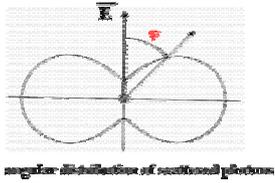


# Polarisation studies for radiative recombination transitions into High-Z ions.

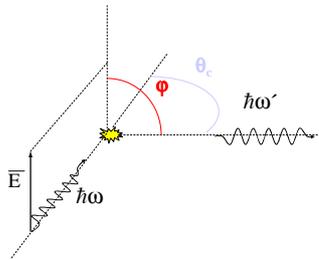
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## Klein-Nishina formula



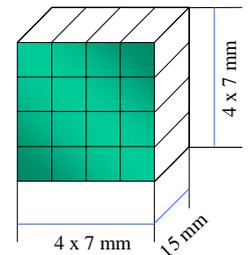
$$\hbar\omega' = \frac{\hbar\omega}{1 + \frac{\hbar\omega}{m_e c^2} (1 - \cos\theta_c)}$$



The polarisation sensitivity of the Compton effect was explored. An angular distribution of photons scattered on free electrons depends on the polarisation of the incoming photons according to the Klein-Nishina formula.

$$\frac{d\sigma}{d\Omega} = \frac{1}{2} r_0^2 \left(\frac{\hbar\omega'}{\hbar\omega}\right)^2 \left(\frac{\hbar\omega'}{\hbar\omega} + \frac{\hbar\omega}{\hbar\omega'} - 2 \sin^2 \theta_c \cos^2 \varphi\right)$$

## Pixel Detector

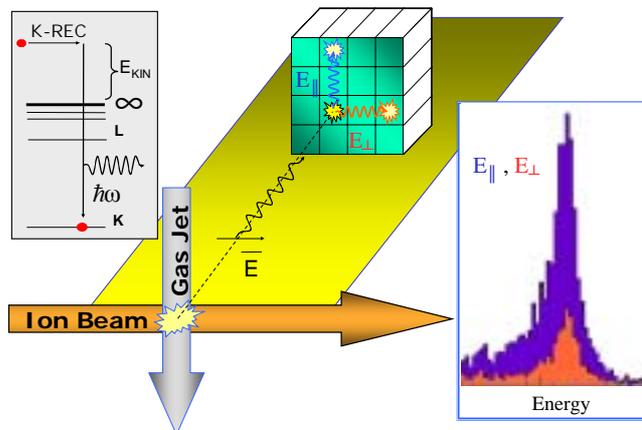


Segmented planar Germanium Detector used for the experiment. The detector consists out of a 4 x 4 pixel matrix (pixel dimensions: 7 x 7 mm). Beside its two dimensional position sensitivity, the detector delivers time and energy information (the typical energy resolution amounts to 2 keV).

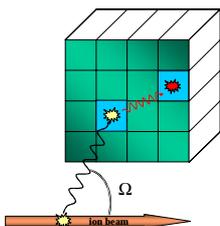
D. Protic, FZ-Jülich

## First polarisation measurement for the K-REC transition

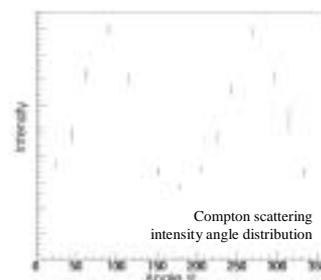
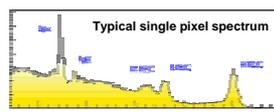
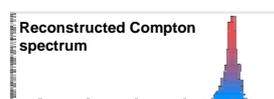
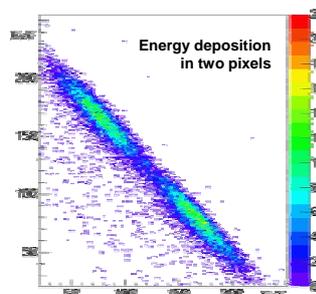
Polarisation of Radiative electron capture transitions into the K shell of a bare uranium (K-REC) in the relativistic regime was studied at the ESR storage ring at GSI. K-REC photons, polarised in the reaction plane (the plane, defined by the ion beam direction and the direction of the photon emission) were being detected by a Germanium Pixel detector. The polarisation can be extracted by analyzing Compton events inside the Pixel detector.



## Data analysis



Coincident registration of events occurring in two separate segments whereby the energy condition  $E_{ph} > E_{el}$  was applied. This allows for a reconstruction of Compton events.



By analyzing different pairs of pixels one can obtain a Compton scattering distribution with respect to the angle  $\varphi$ , which fits well to the Klein-Nishina formula. That allows us to extract information about the degree of the photon polarisation along with its orientation.