

## Visualisation of the beam and target interaction region at ANKE with MCPs†

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At the ANKE cluster-jet target at COSY it was successfully demonstrated for the first time that the interaction region, i.e., the passage of the COSY beam through the internal target, can be visualised by using a Micro Channel Plate (MCP) detection system. The detector system was initially designed and constructed to visualise the shape of the ionised cluster beam defined by the collimator [1]. It consists of a grounded grid with 2.5 mm lattice spacing, two MCPs in chevron assembly with an effective diameter of 40 mm, and a phosphor screen combined with a CCD camera. The cluster-jet beam can be ionised, e.g., by an electron beam, and the MCP signals can be directly observed. In addition to the possibility

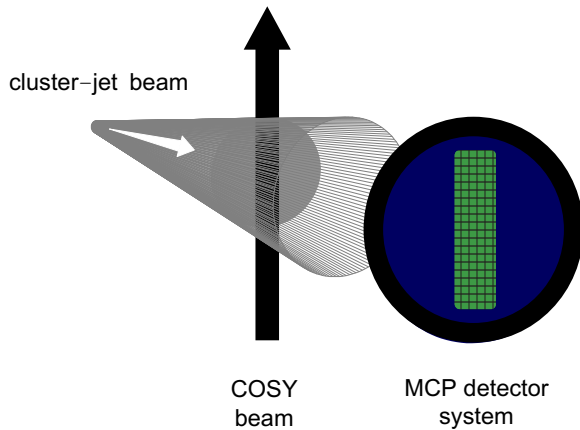


Fig. 1: Schematical drawing of the ionisation of the cluster-jet beam by the passing COSY beam, which is subsequently detected.

to run adjustment checks during target operation, this system offers a new method to visualise the interaction region of the accelerator beam and the internal target. For this purpose the MCP system was installed at the end of the beam dump of the ANKE cluster-jet target. Passing the internal cluster-jet target, the accelerator beam ionises the uncharged clusters, which are detected at the beam dump with the MCPs (see Figure 1). In Figures 2, 3, and 4 a direct observation of the ionised cluster-jet beam is shown. The abscissa represents the horizontal spatial direction and the ordinate the COSY beam direction. While the ordinate corresponds to the ion beam direction, Figure 2 shows the projection of the interaction zone at COSY beam injection energies and Figure 3 the interaction zone after acceleration (reduced phase space). The influence of the adiabatic cooling is clearly visible. In Figure 4 the shift of the interaction zone induced by switching on a steerer magnet is depicted. This type of measurement offers a completely new possibility to monitor the interaction region (of beam and target) at internal target experiments.

### References:

- [1] A. Zannotti, Implementation and test of fundamental production, adjustment, and detection components of PANDA cluster-jet target, Bachelor Thesis, University of Münster, 2012

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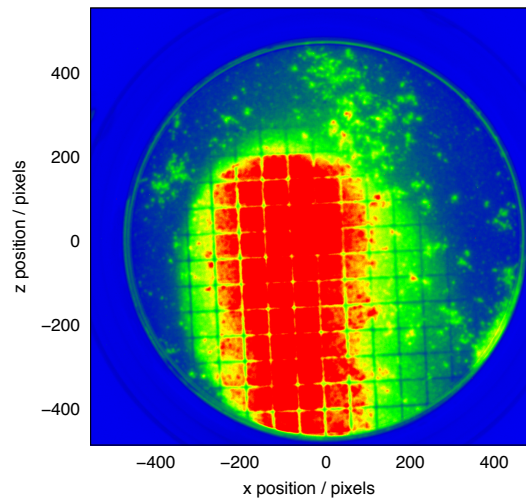


Fig. 2: Interaction region at COSY beam injection energies.

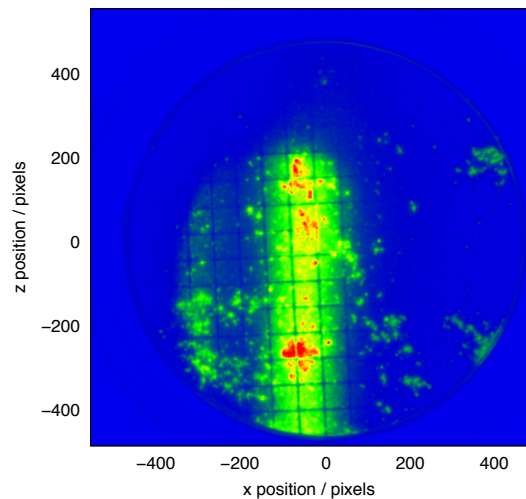


Fig. 3: Interaction region after COSY beam acceleration.

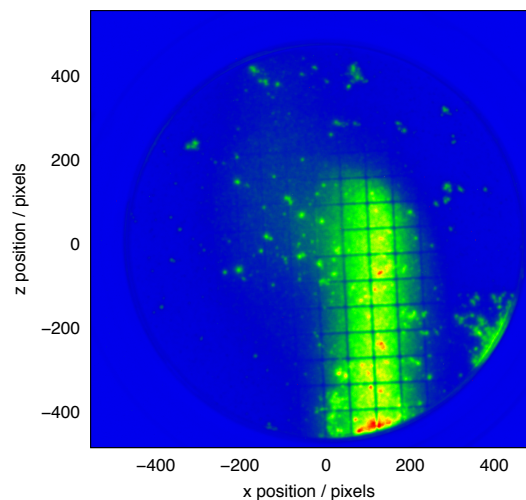


Fig. 4: Shift of the interaction region caused by an active steerer magnet.