

# News from the Cluster-Jet Target

**Ann-Katrin Hergemöller**

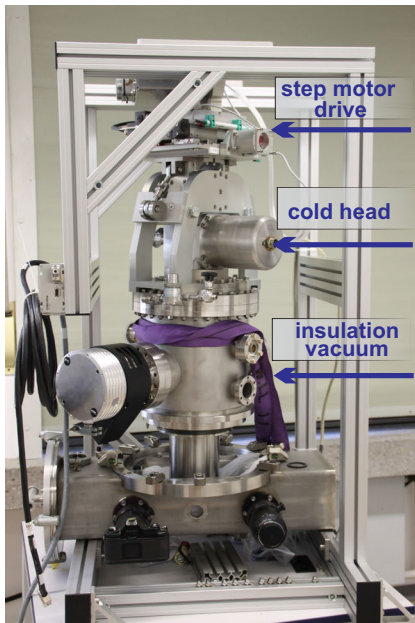
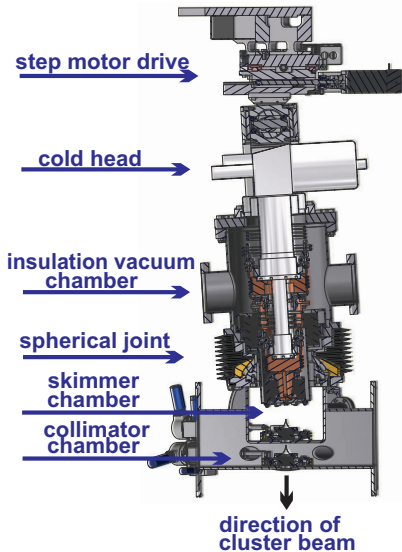
Westfälische Wilhelms-Universität Münster, Institut für Kernphysik  
PANDA Meeting Darmstadt, December 11th 2013



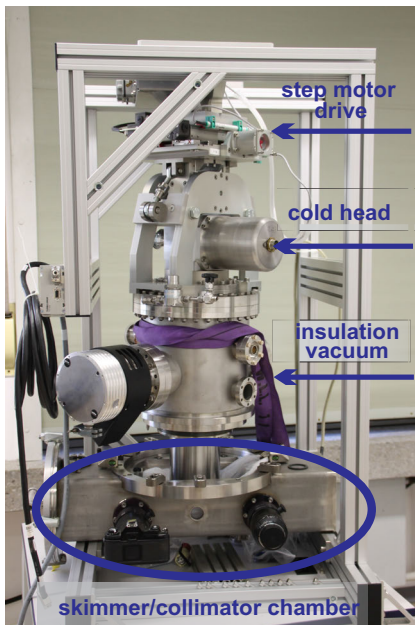
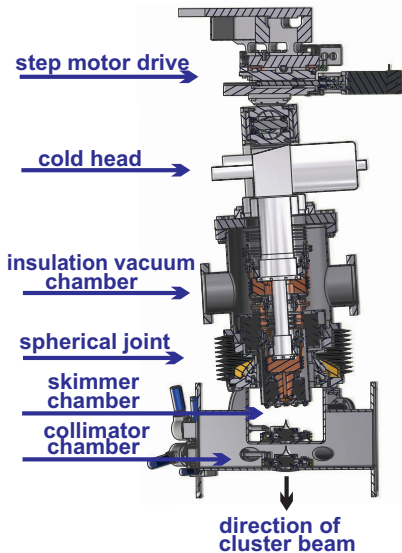
Bundesministerium  
für Bildung  
und Forschung



# Setup of the new Cluster Source

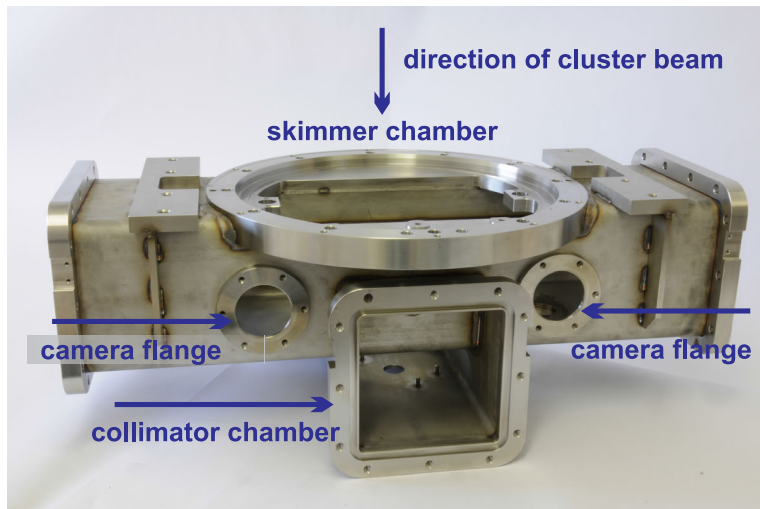


# Setup of the new Cluster Source



# Setup of the new Cluster Source

## Skimmer/Collimator chamber

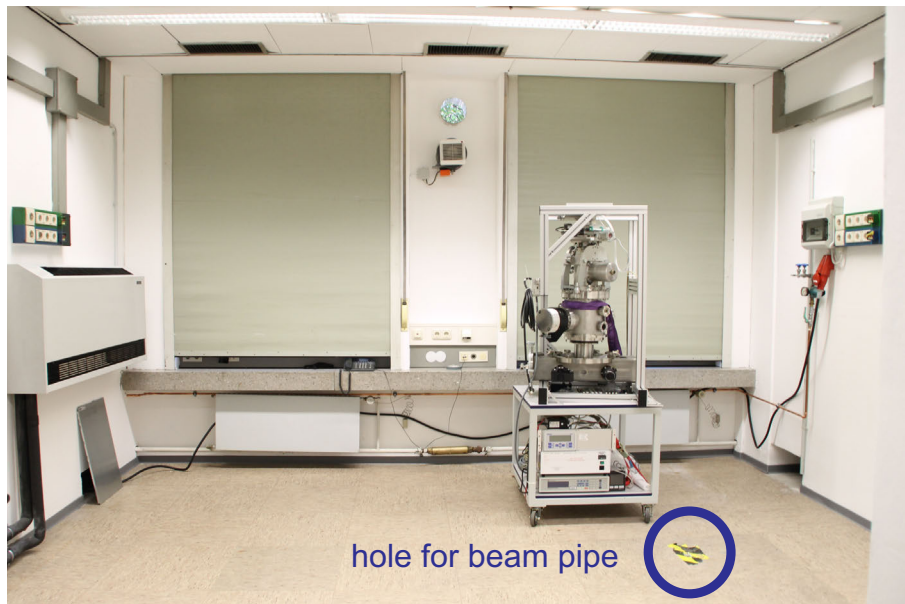


Currently in preparation

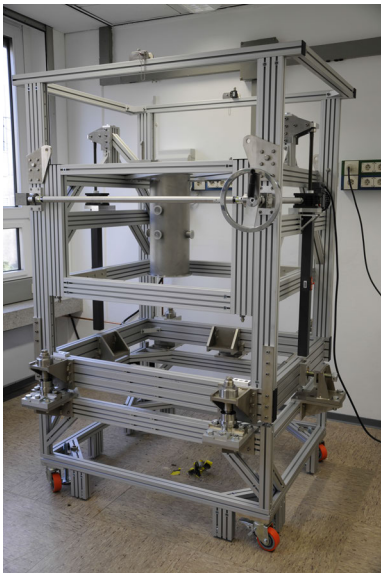
# Vertical Setup in a new Laboratory



# Vertical Setup in a new Laboratory

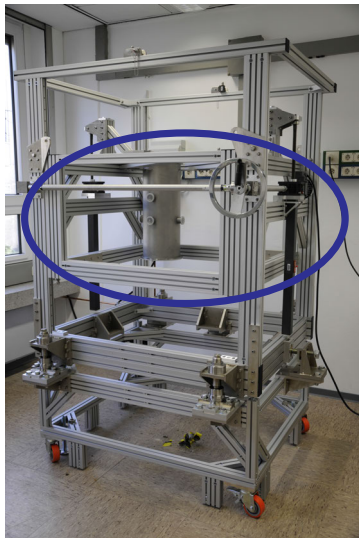


# Support Frame



# Support Frame

## Lifting system

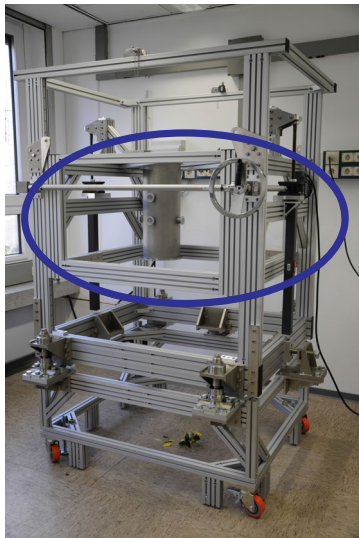


- Cluster source can be lifted up and dropped down automatically for maintenance
- Last few centimetres per hand wheel

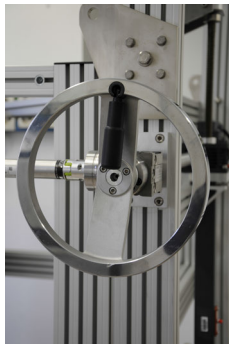


# Support Frame

## Lifting system

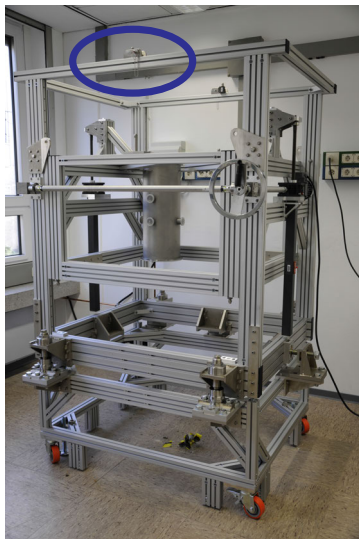


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# Support Frame

## Safety arrangements

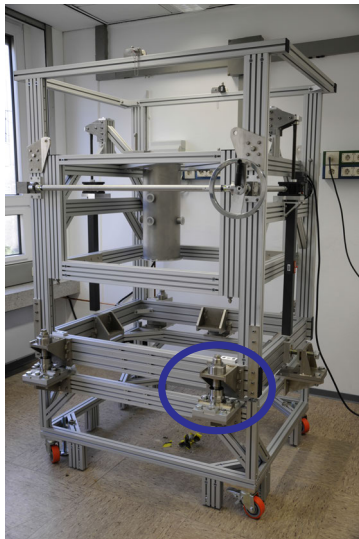


- Frame can be locked up by a pin
- End switch prevent any action (e.g. drop down)
- Status of end switch can be read out by a computer (slow control)

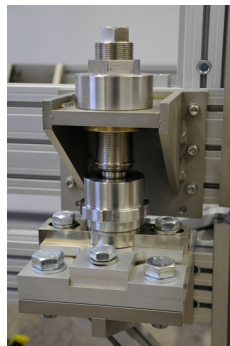


# Support Frame

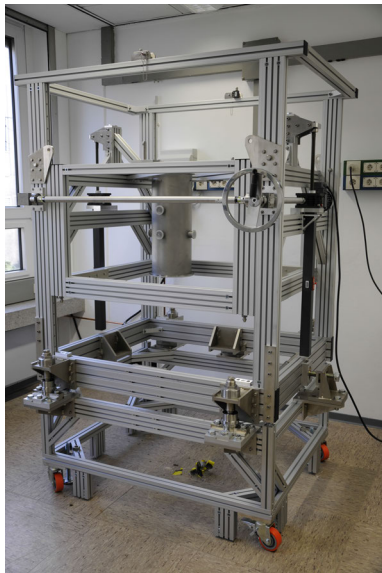
## Adjustable mounting points



- Lower part of the frame represents the magnet
- Four mounting points
- Adjustable in all directions



## Setup of the cluster source → **Next steps**

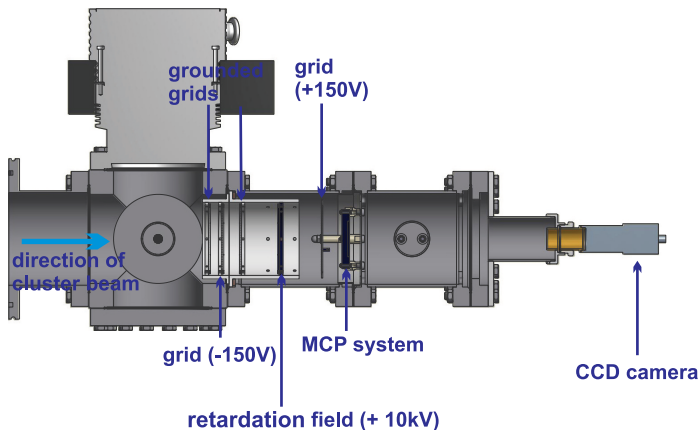


- Finishing of the skimmer/collimator chamber
- ⇒ Final setup of the cluster source
- Installation of the final pumping station in the new laboratory
  - ⇒ Integration with the cluster source
- Installation of vertical beam pipes
- Setup of a (temporary) slow control system
- Implementing and tests

# Further Studies

## Mass Measurements with MCPs

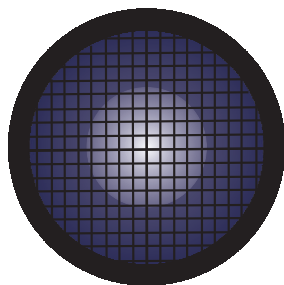
- Mass measurements at the target prototype (E. Köhler)
- Cluster beam ionised by an e-gun
- Clusters are stopped by an retardation field
- Assembly of grids for background reduction (cluster fragments...)



# Further Studies

## Mass Measurements with MCPs

- Stopping of light clusters successful
- ⇒ Calculation of cluster mass ongoing
- Further mass measurements at various pressure and temperature settings
- Analysis of background origin
- ⇒ Influence on the intensity/mass distribution

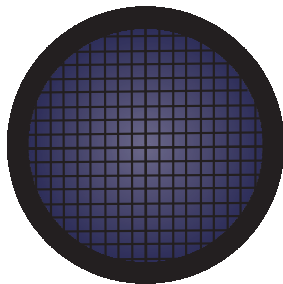


Without retardation field

# Further Studies

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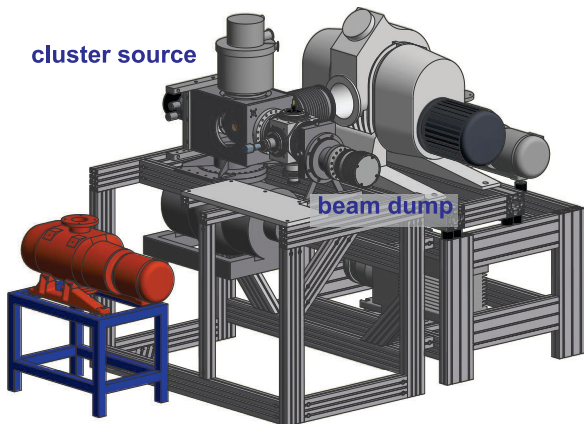


With retardation field (up to 10 kV)

# Further Studies

## Construction and tests of a compact cluster-jet target

- Construction of a compact cluster-jet target (MCT1S) for laser induced ion acceleration in cooperation with ILPP (S. Grieser)
- Cluster source of the first target prototype for PANDA
- Dimension: approximately 2 m × 2 m

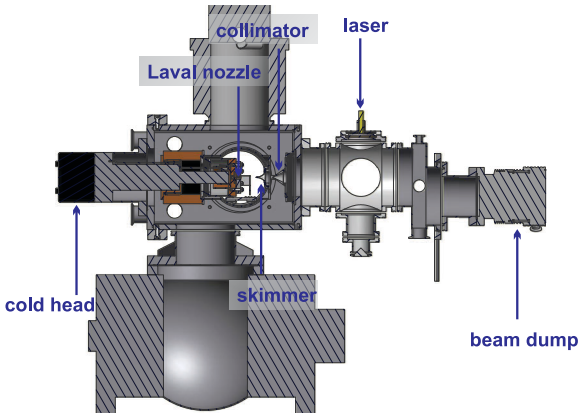




# Further Studies

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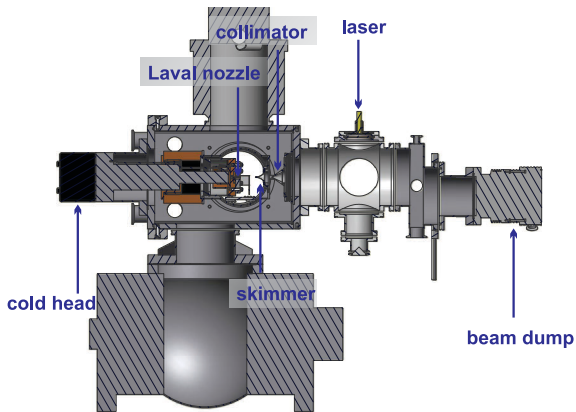
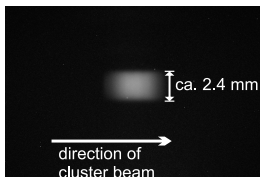
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# Further Studies

## Construction and tests of a compact cluster-jet target

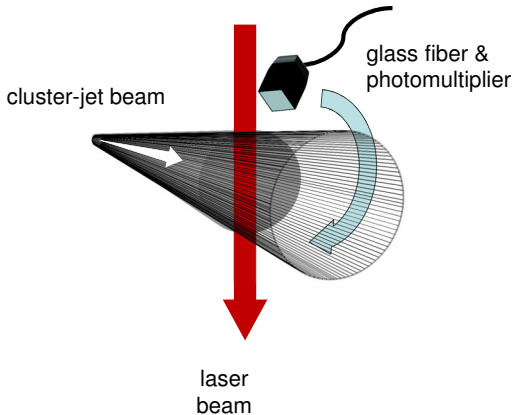
- Cluster beam visualised by a laser
- Distance from nozzle 330 mm
- Relative density analysis ongoing
- Valuable option for density and position checks at the PANDA target



# Further Studies

## Determination of cluster size by Mie scattering

- Mie measurements were done at University of Frankfurt (Group R. Grisenti)
- Measurements directly behind the nozzle
- Calculation of cluster size from scattered light
- First measurements at the MCT1S
- Implementing of the experimental setup ongoing
- Measurements at the PANDA target are planned



## Status of the Cluster-Jet Target for PANDA

- Central part of cluster source built up and tested successfully
- Design and construction of complete source ongoing
  - Spherical joint installed at the cluster source
  - Skimmer/Collimator chamber ready in January 2014
- Support frame is built up
  - Automatic lifting system is working
  - Safety arrangements implemented
  - Mounting system to the magnet installed

## Further Studies

- Determination of the cluster mass with the MCP detector and a retardation field
- Determination of the cluster size by Mie scattering
  - At the MCT1S
  - At the PANDA target