

Status of the Cluster-Jet Target

Ann-Katrin Hergemöller

Westfälische Wilhelms-Universität Münster, Institut für Kernphysik
PANDA Collaboration Meeting, March 8th 2017

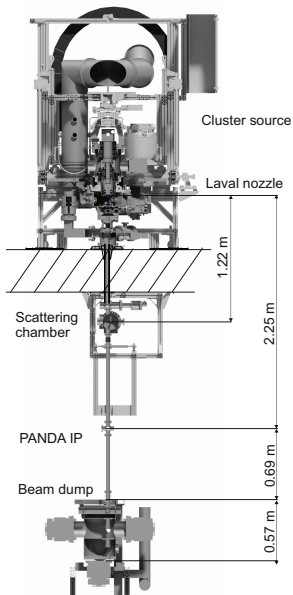


Bundesministerium
für Bildung
und Forschung



PANDA Cluster-Jet Target

Status last Meeting

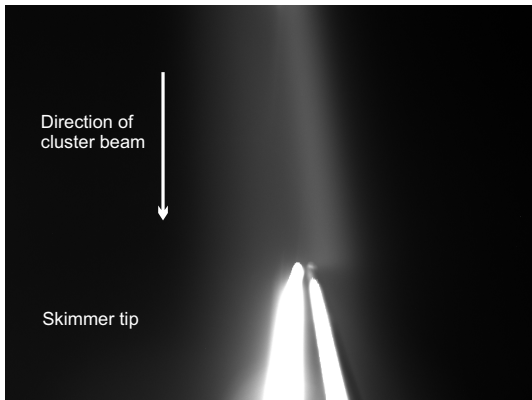


- Cluster source built up
- Scattering chamber installed
- Beam Dump from Genoa installed
- Optical monitor system in TVC
- Scanning rod system in scattering chamber

Cluster Beam Stability

Instabilities

- Often: clogging of nozzle
- Cluster beam was not stable at liquid stagnation conditions
- Gas flow decreased with time → nozzle freezing?

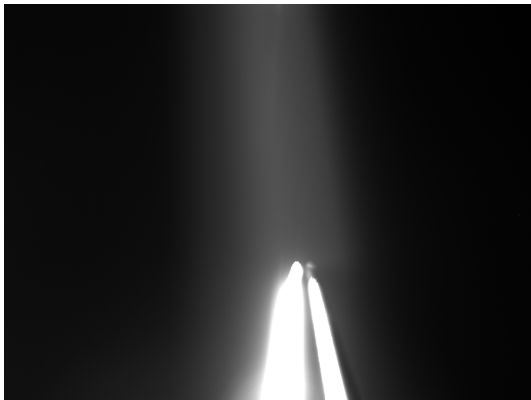


10 bar & 24 K, pictures recorded every 5 s

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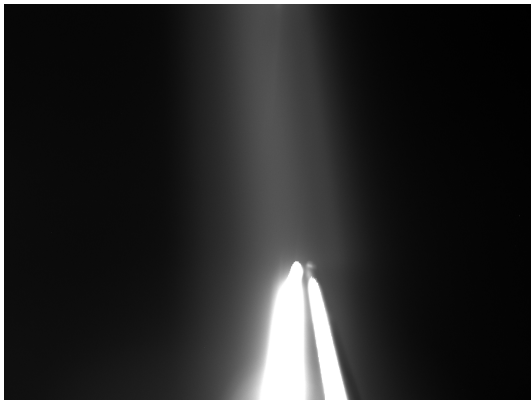


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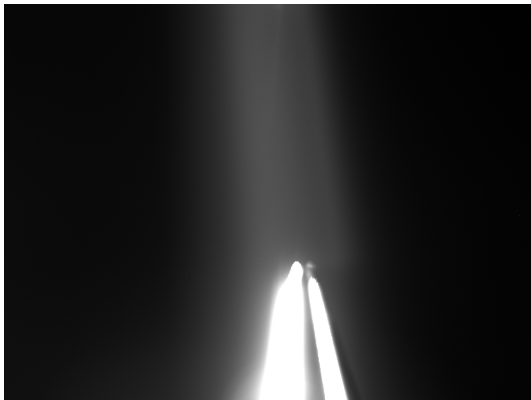


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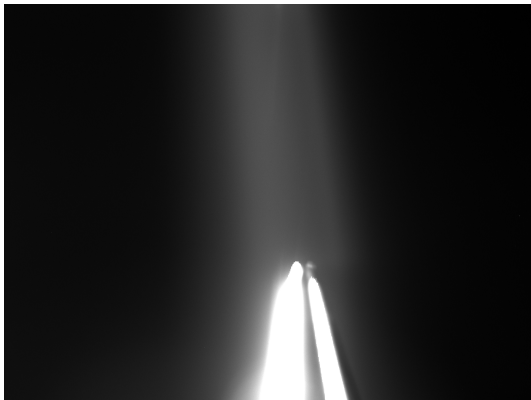


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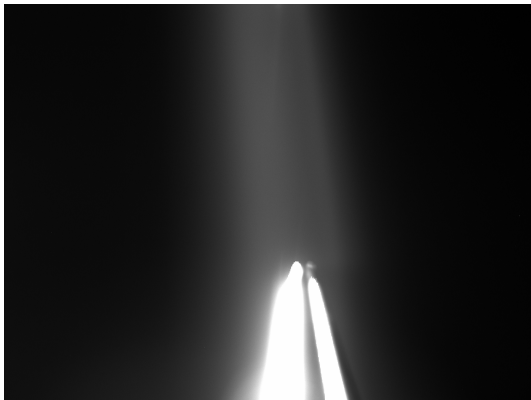


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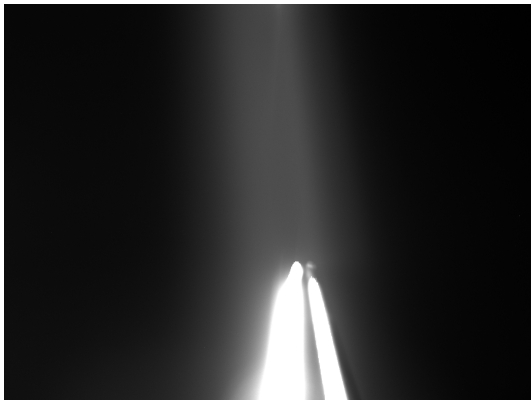


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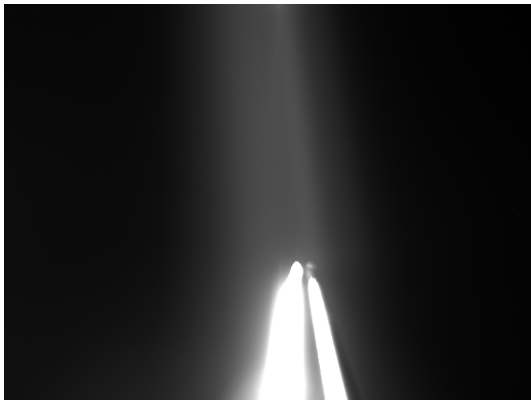


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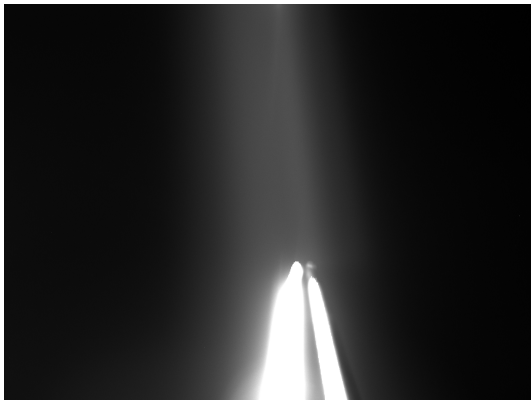


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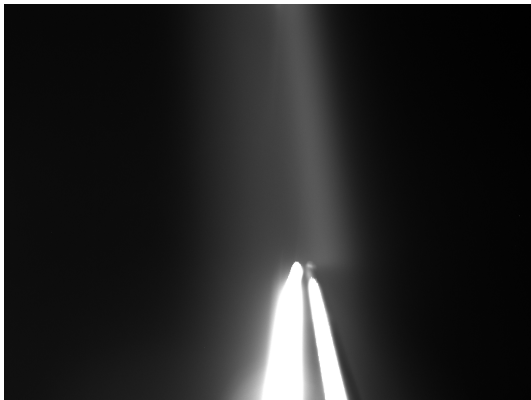


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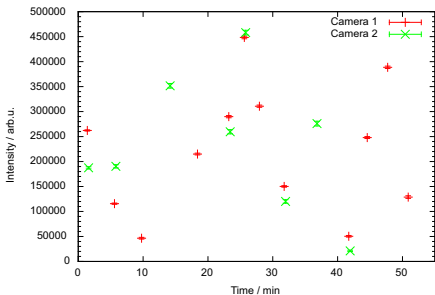


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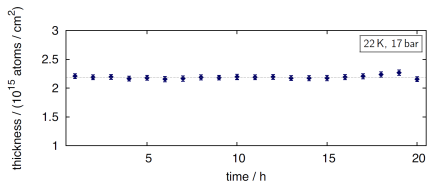
Cluster Beam Stability

Final target vs. prototype

PANDA target



Prototype



Scanning rod system

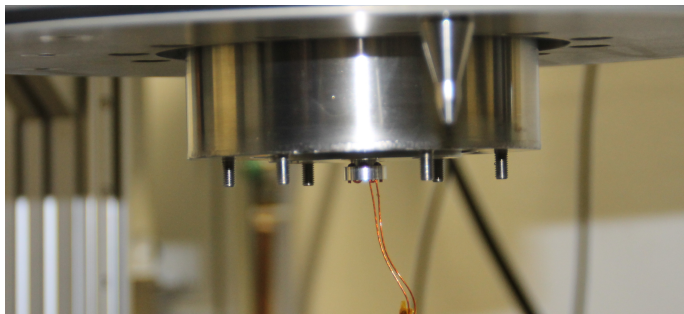
Optical monitor system of TVC

E. Köhler, PhD Thesis, WWU Münster 2015

Cluster Beam Stability

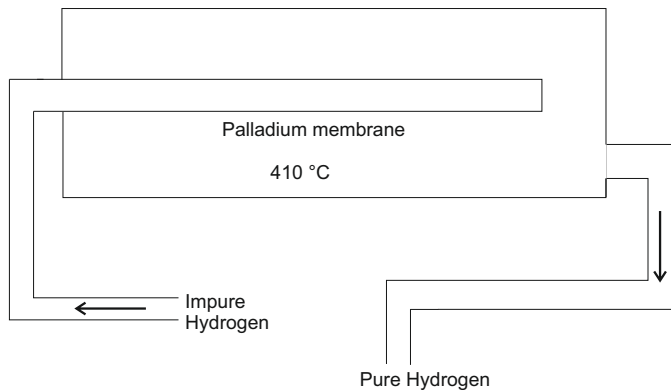
Instabilities

- Partial heating of nozzle
- nozzle heater (several wire loops in aluminum holder)
- Prevent freezing of nozzle → stable gas flow
- Unstable core beam was still present



Test of Hydrogen Purifier

- Possible reason for instabilities: Leakage of purifier membrane
 - Test with helium at hydrogen inlet
- ⇒ Large leakage! Helium flows directly in outlet line



Test of Hydrogen Purifier

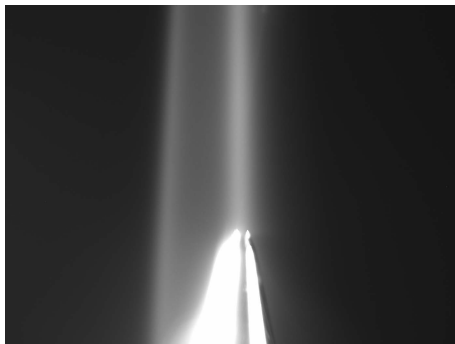
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Cluster Beams

Stability

- Change of hydrogen purifier → BUT: with limited gas flow/pressure
⇒ Stable cluster beam with highly intense core beam

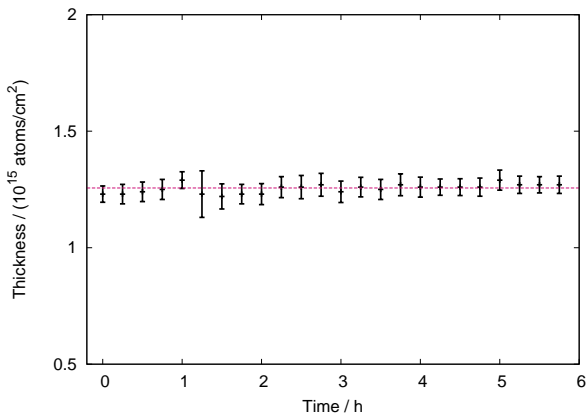


26 K, 15 bar

Cluster Beams

Stability

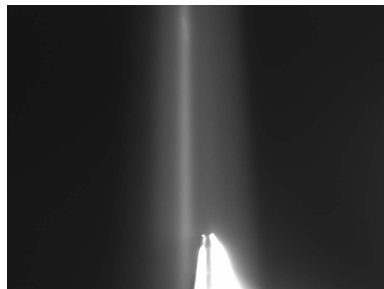
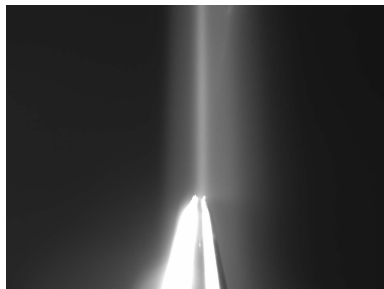
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Cluster Beams \rightarrow Highest Thickness

Adjustment with spherical joint, skimmer & collimator

- Two cameras at skimmer chamber (installed 90° to each other)
- \Rightarrow Adjustments needed!

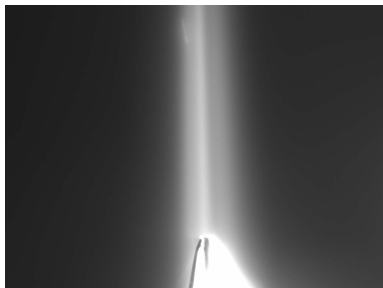
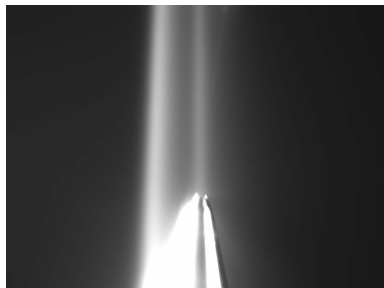


22 K, 15 bar

Cluster Beams \rightarrow Highest Thickness

Adjustment with spherical joint, skimmer & collimator

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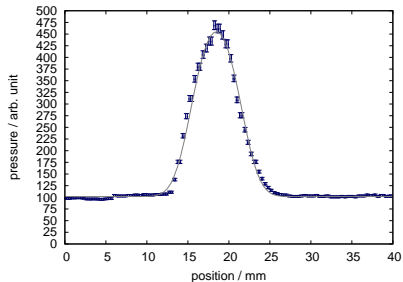
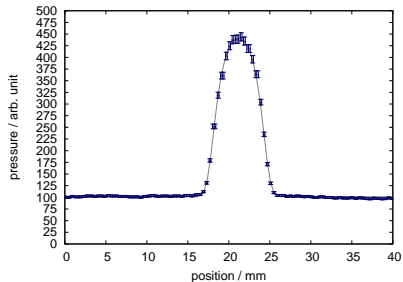


20 K, 15 bar

Cluster Beams → Highest Thickness

Thickness

20 K, 15 bar



$$(2.6 \pm 0.3) \times 10^{15} \frac{\text{atoms}}{\text{cm}^2}$$

- Fine adjustments needed
- Thickness in scattering chamber! (Factor of 4 less at IP)
- Higher pressure will lead to higher thickness

Next Steps

- Further adjustments
- ⇒ Highest thickness!
- Beam stability tests
- Determination of vacuum conditions (IP, Beam Dump...)
- Transport to COSY/Jülich in summer 2017
- ...

