

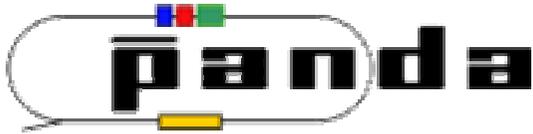


PANDA collaboration Meeting
GSI Darmstadt
June 1-3, 2004



Status report internal cluster-jet targets

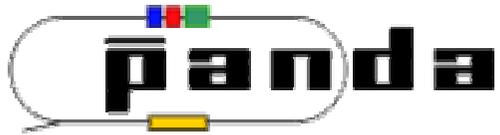
- Activities and Plans with the Münster Cluster-Jet Target
- Status of the GSI, IMEP and INFN activities
- JRPA-7 meeting in Genova on July 28 and 29, 2004



Goal of the hydrogen cluster-jet sub-group

- ➔ how to reach the PANDA cluster-jet density by
 - developing new nozzles
 - finding optimal gas pressure / temperature setting
 - optimisation of beam divergence

- ➔ minimizing the gas load into the beam vacuum

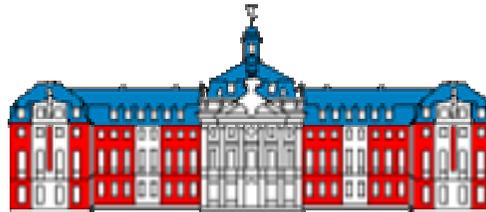


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Activities and Plans **with the** **Münster Cluster-Jet Target**

Alfons Khoukaz



Westfälische Wilhelms-Universität
Münster

Modification of the Münster Cluster-Jet Target

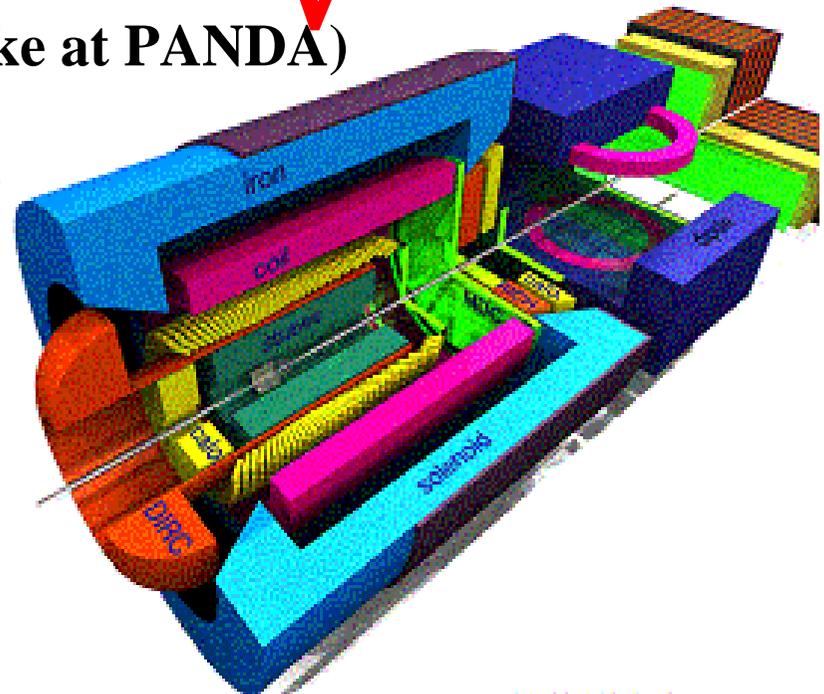
Properties of the cluster beam should directly be interpretable for a possible future PANDA set-up!

⌚ extensive modification of the existing assembly of the Münster cluster target installation:

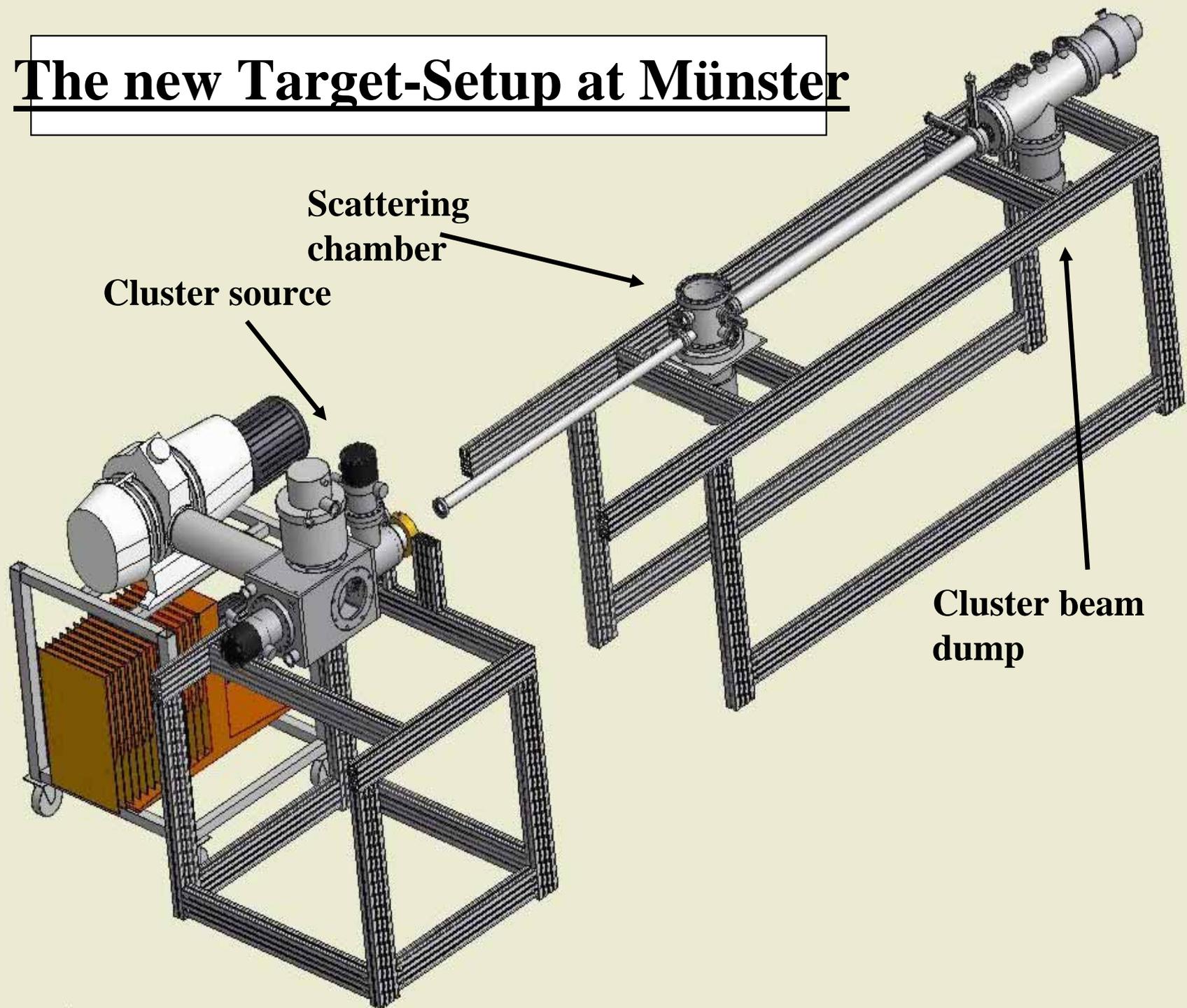
- extension of the distance **nozzle/interaction point** from 65 cm ⌚ 206 cm (corresponds to target ~ outside iron yoke at PANDA)

- extension of the distance **interaction point/ beam dump**

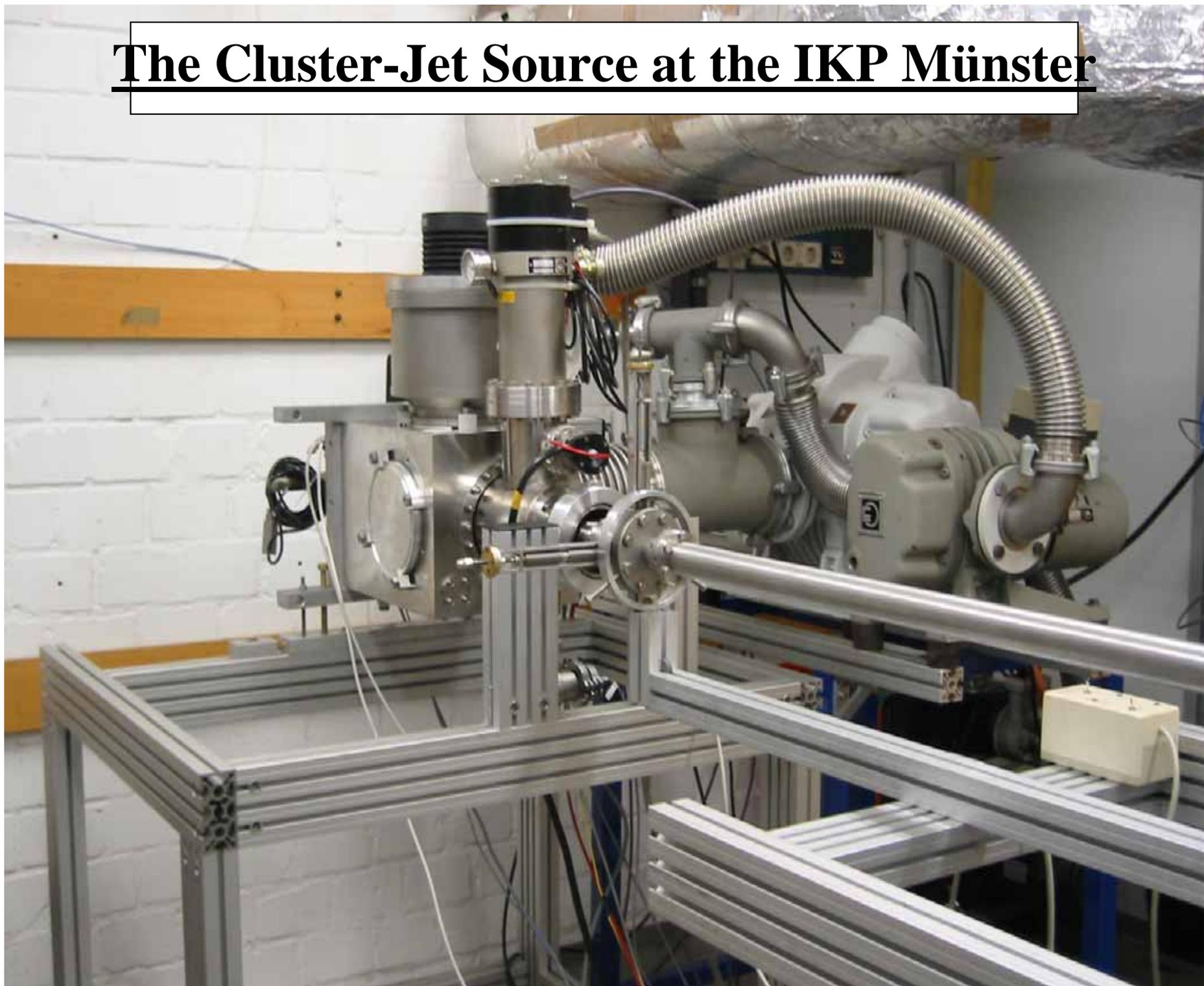
- usage of thin cluster **beam pipes**

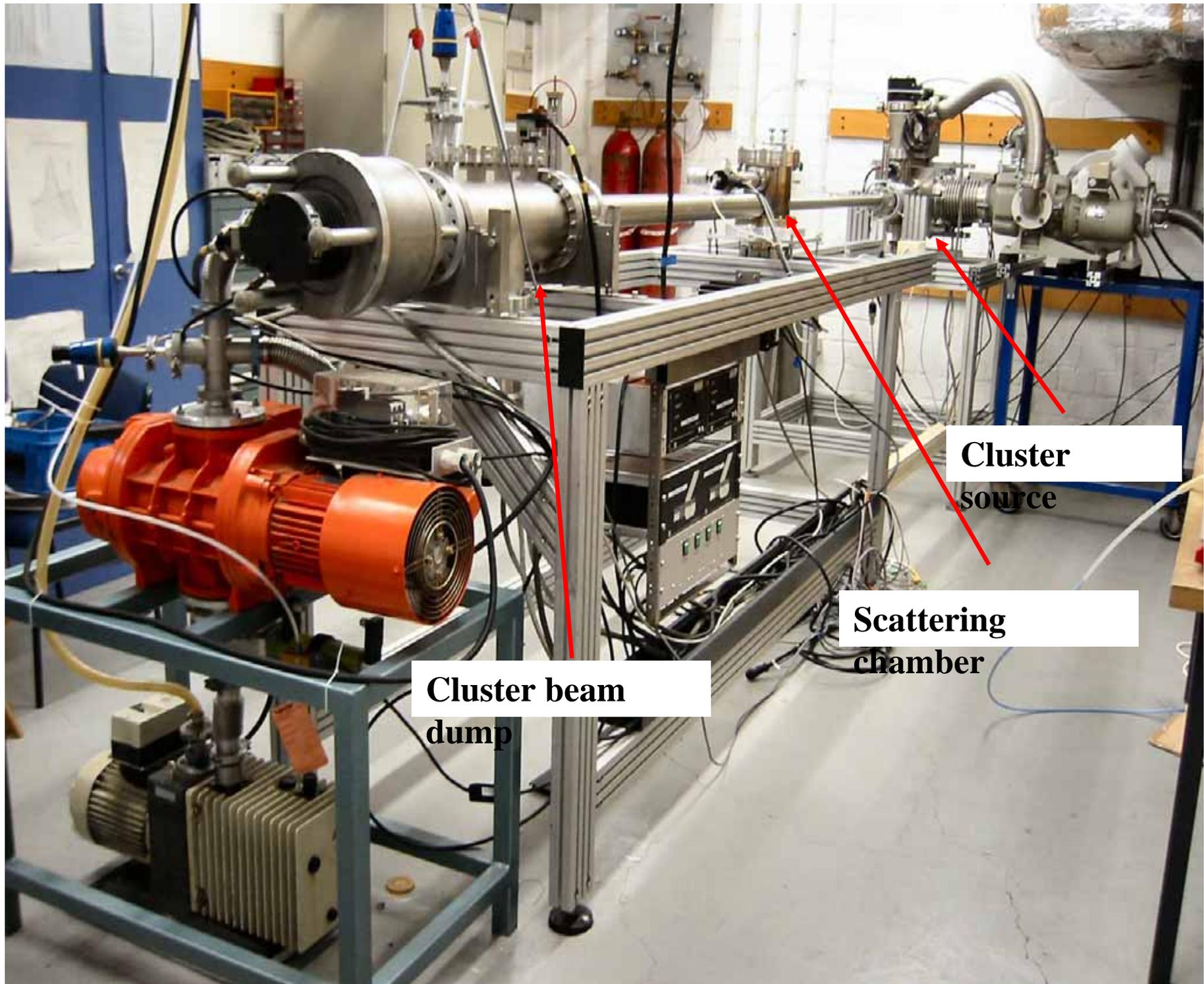


The new Target-Setup at Münster



The Cluster-Jet Source at the IKP Münster



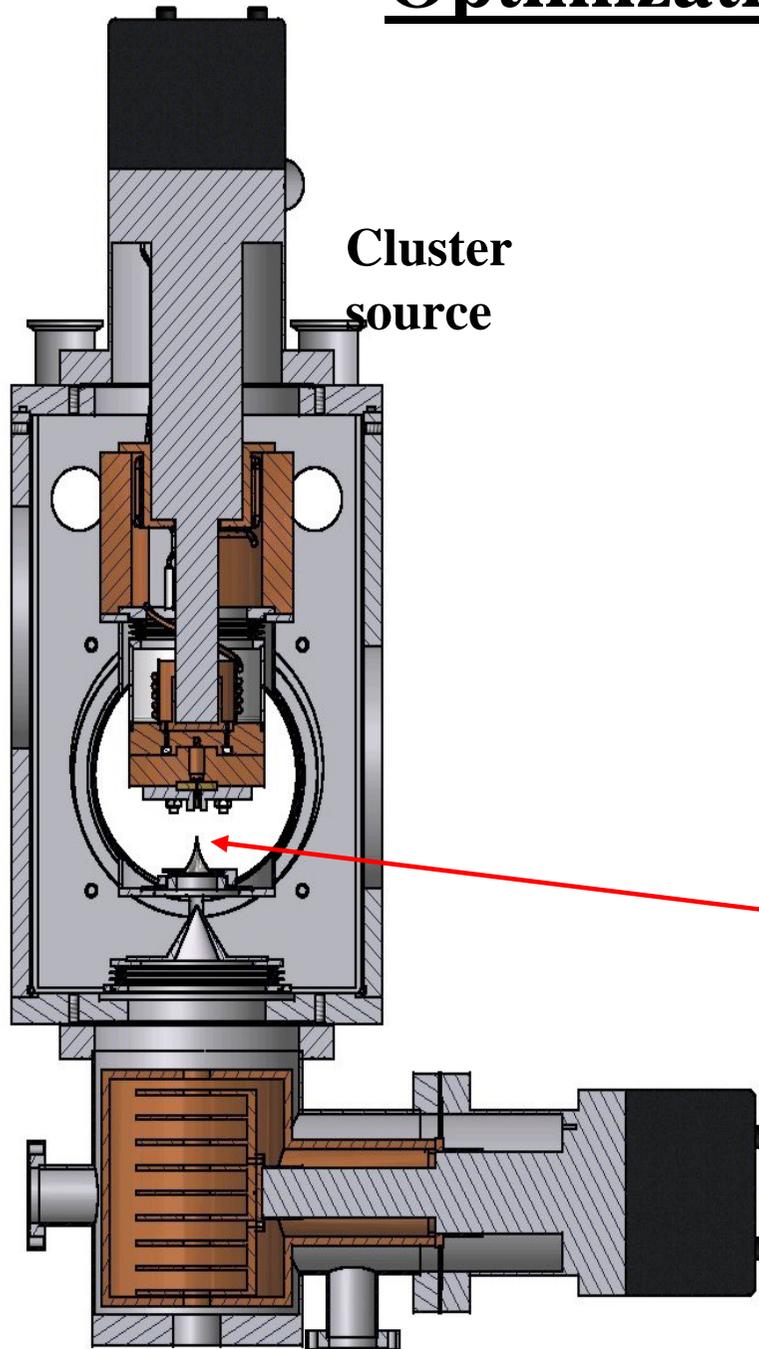


**Cluster beam
dump**

**Scattering
chamber**

**Cluster
source**

Optimization of Beam Apertures

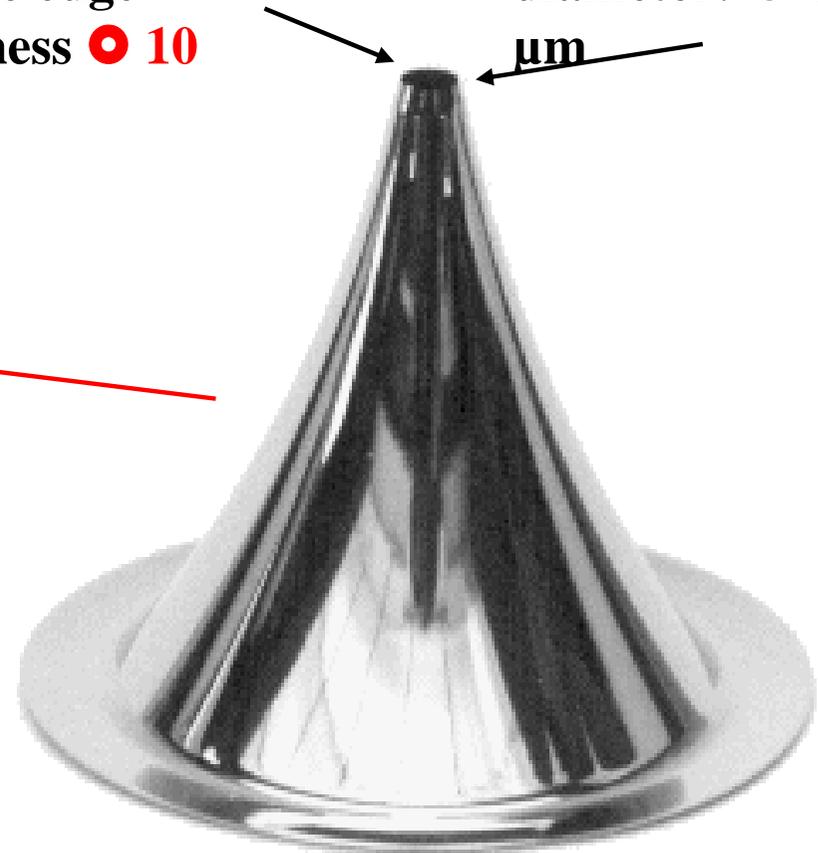


Cluster
source

- use of new cluster **beam skimmers** with special features
 - ⑨ **higher cluster beam transmittance,** reduction of density losses due to **flow resistance**

Orifice edge
thickness ● 10
μm

diameter: ● 700
μm



Completed and Current Activities

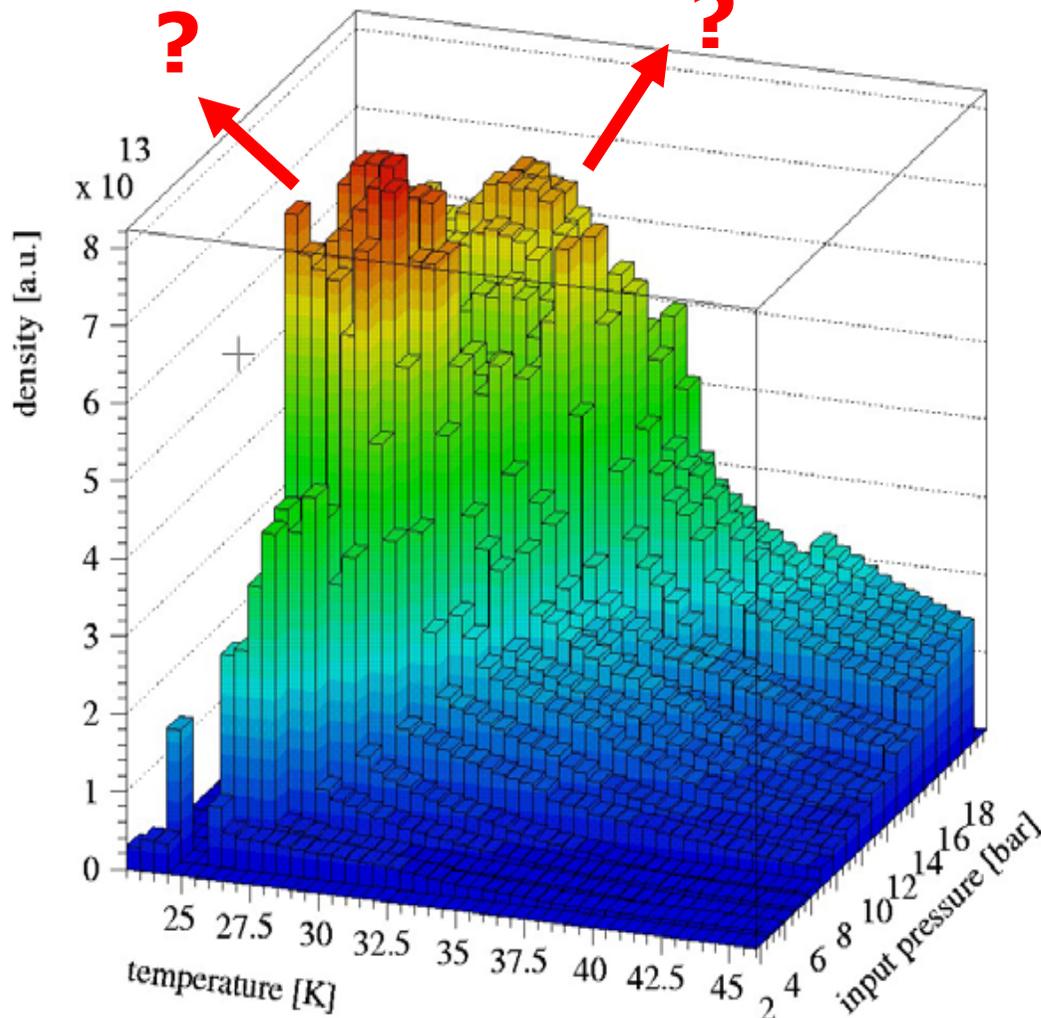
- Completion of the **gas feeding system** ✓
- **First tests** with **hydrogen cluster** beams and **alignment** of the cluster beam installation ✓
- Installation of a **slow control system** ✓
- Development of a computer-aided cluster beam scanner
 - ⑨ recording of **beam profiles** ✓
- Calibration of the beam scanner
 - ⑨ **absolute size and densities of the target beam** ✓
- Now: Determination of **density maps** $\rho(p,T)$

Near Future Activities

higher densities due to...

lower
temperatures

higher
pressures



- Tests with different nozzles (**8-30 μm diameter**) ⑨ new developments?
- Studies on vacuum conditions
- Studies on target beam **shape, diameter, density**
- Target operation with higher gas input pressures ⑨ **new hydrogen purifier ordered**
- Lower temperatures ⑨ **more cooling power**

Activities of the GSI – IMEP - INFN group:



- ✓ **Workshop July 28 – 29, 2003 :**
Cluster-jet target inside PANDA magnet

- ✓ **Preparation of shipping INFN cluster-jet target**
from Fermilab to GSI

- ✓ **Optimisation cluster-jet target, theoretical studies,**
work in progress (V. Varentsov, Radium Institute, St. Petersburg)

- ✓ **Setup INFN cluster-jet target at GSI (GSI – IMEP – INFN)**

- ✓ **Meeting JRA7 at Genova July 28 – 29, 2004**

INFN Cluster-jet target (FNAL E760, E835)



arrived at GSI



- LAB space available
- setup will start July 2004
- ready for tests autumn 2004

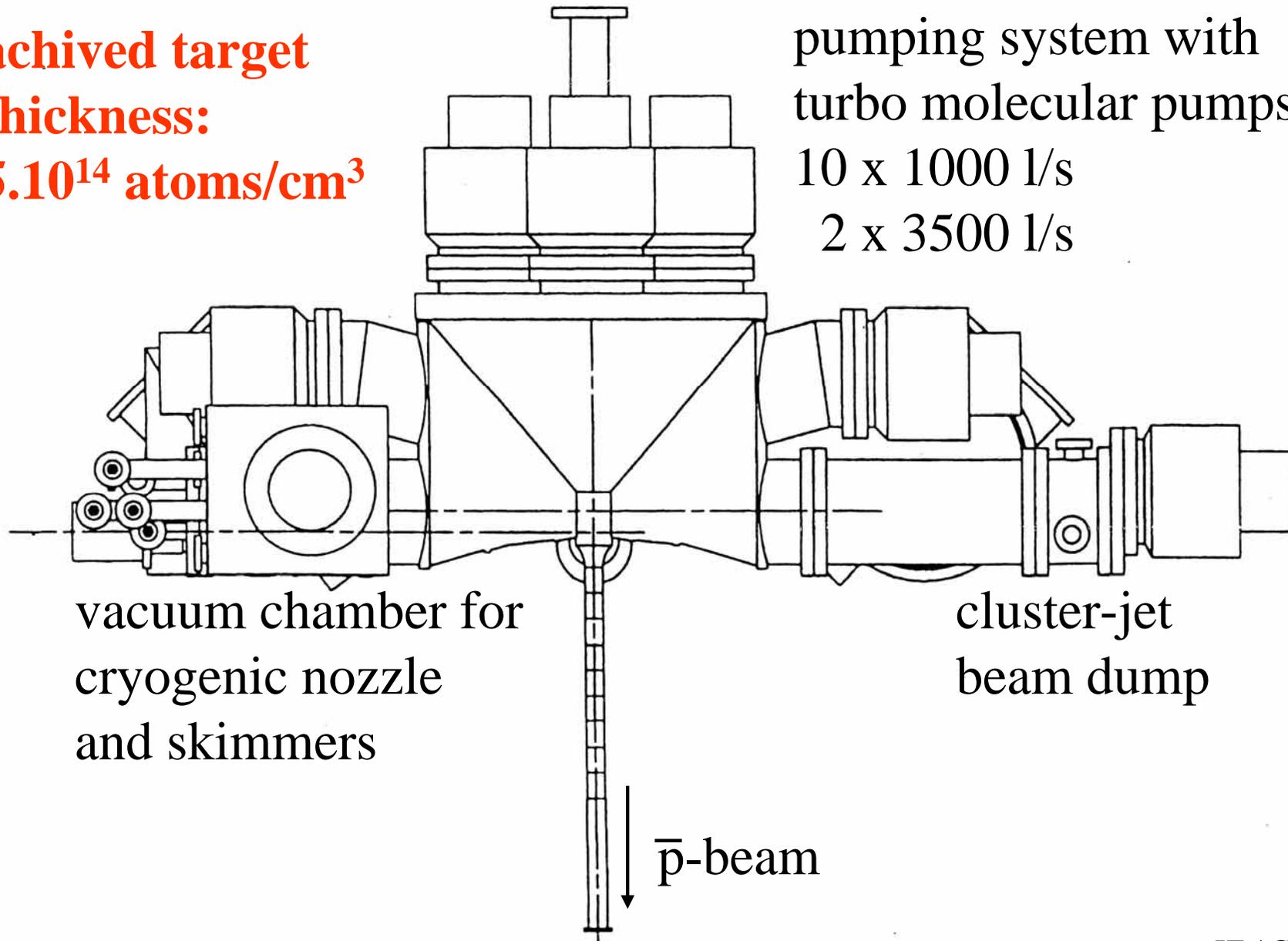
work shared by:
GSI – IMEP – INFN

Goal: increase of the hydrogen cluster-jet density
studying different nozzle designs
optimisation of nozzle skimmer interaction

INFN Cluster-jet target (FNAL E760, E835)

achived target
thickness:
 $5 \cdot 10^{14}$ atoms/cm³

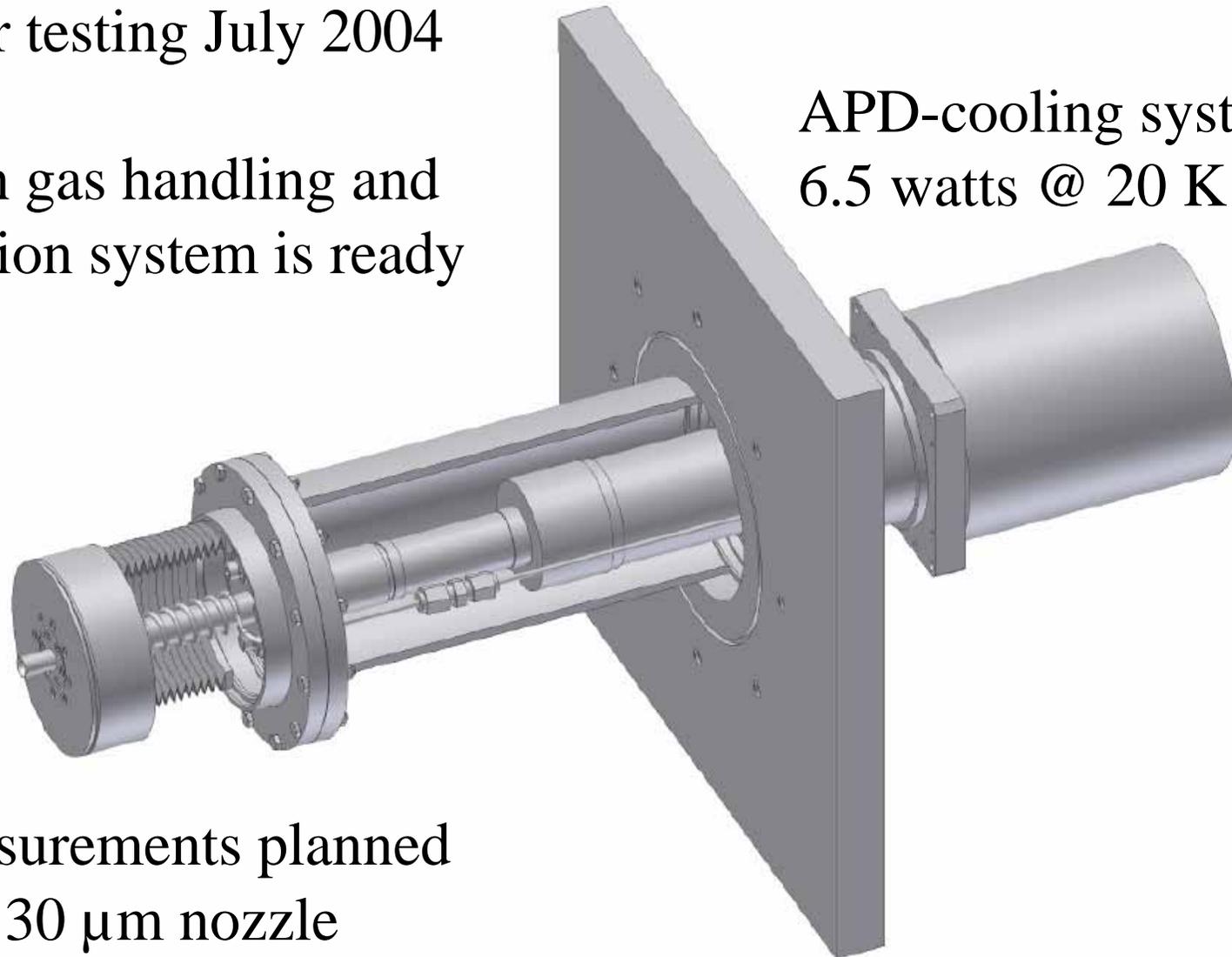
pumping system with
turbo molecular pumps:
10 x 1000 l/s
2 x 3500 l/s



Cryogenic cluster-jet head

setup at IMEP for nozzle tests

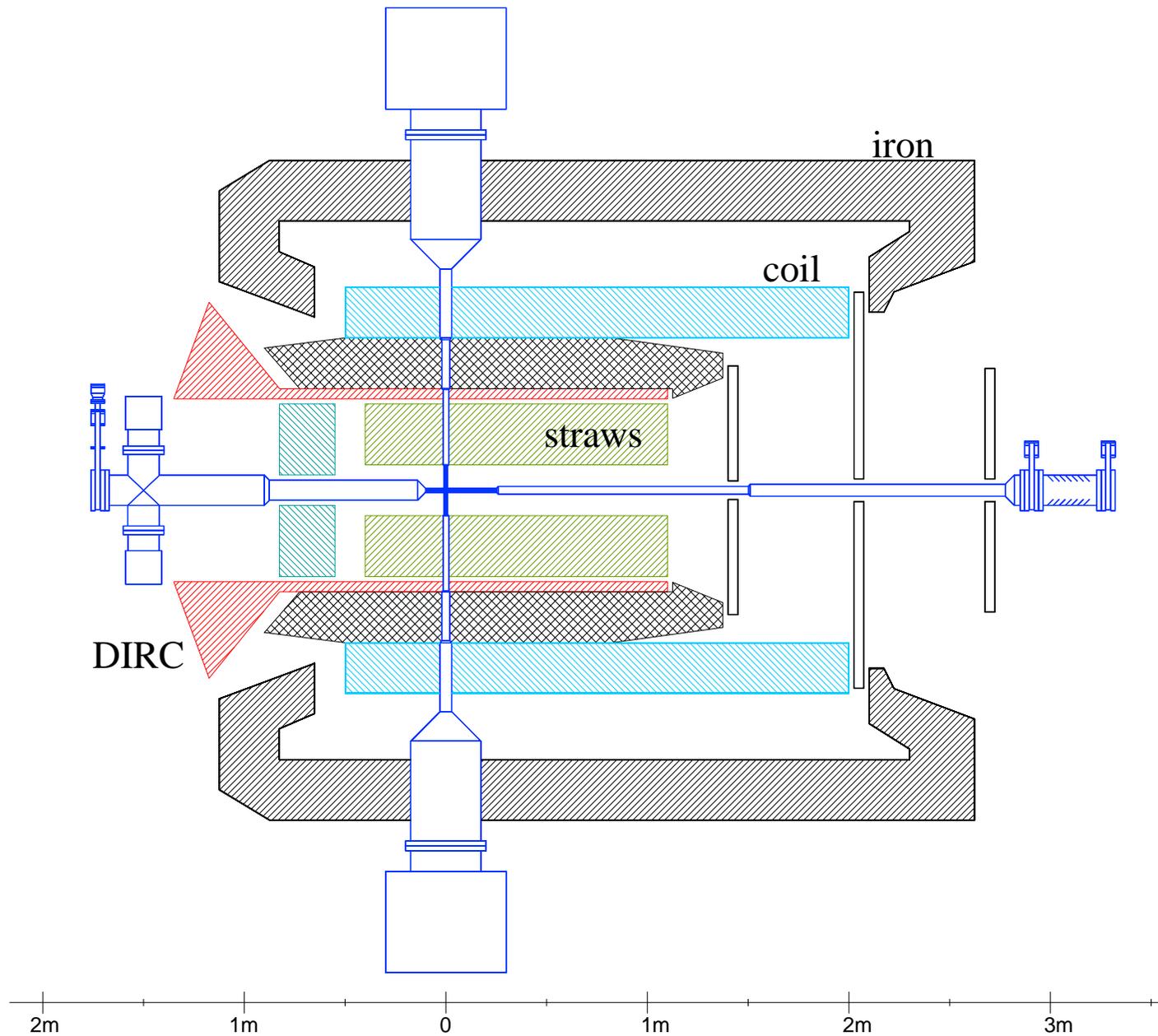
- cryogenic cluster-jet head ready for testing July 2004
- hydrogen gas handling and purification system is ready



APD-cooling system
6.5 watts @ 20 K

- first measurements planned with a $\varnothing 30 \mu\text{m}$ nozzle

PANDA interaction zone – possible target setup



PANDA intonation region:

Studies of the vacuum conditions with H₂ gas load

