

News from the Cluster-Jet Target

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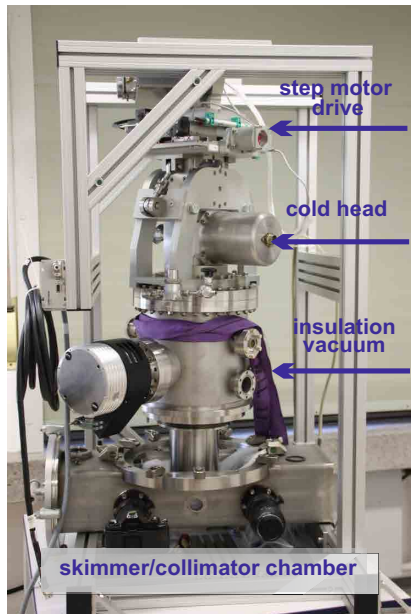
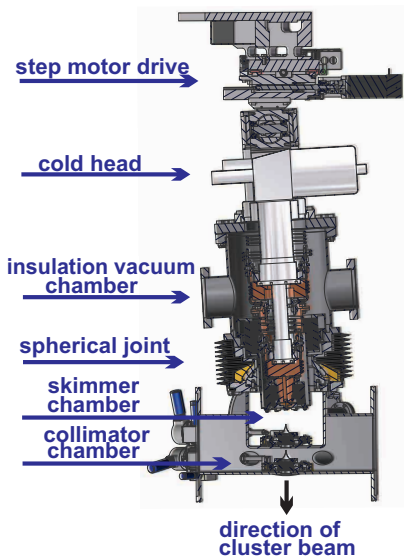
PANDA Meeting Darmstadt, June 10th 2014



Bundesministerium
für Bildung
und Forschung



Setup of the new Cluster Source

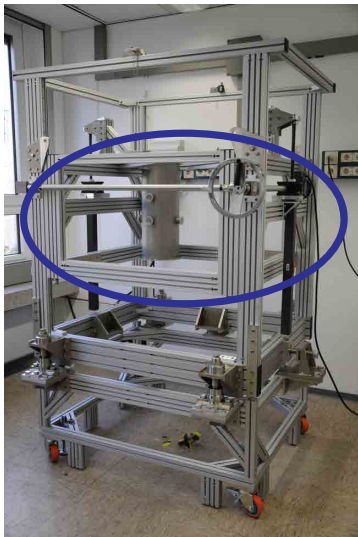


Setup of the new Cluster Source Support Frame



Setup of the new Cluster Source

Support Frame



- Automatic lifting system
- Last few centimetres per hand wheel

Setup of the new Cluster Source

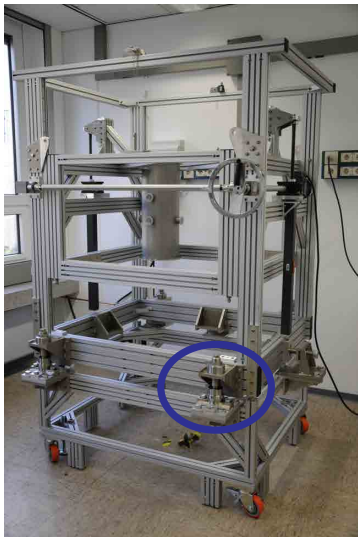
Support Frame



- Automatic lifting system
 - Last few centimetres per hand wheel
- Safety arrangements
 - End switches prevent any action while frame is locked

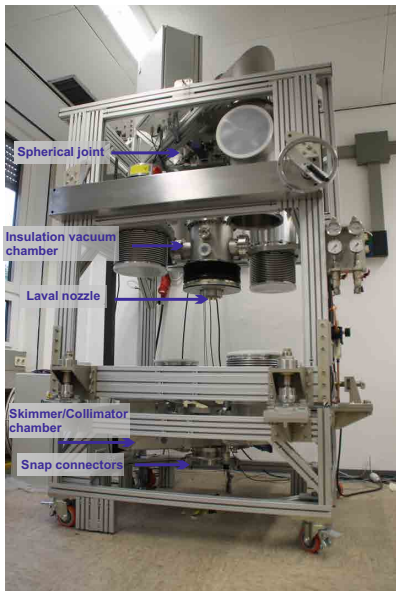
Setup of the new Cluster Source

Support Frame

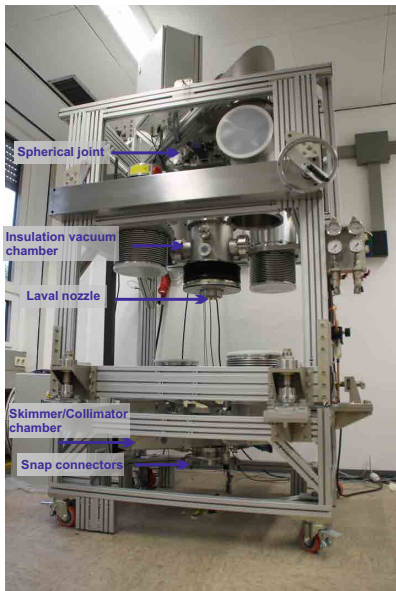


- Automatic lifting system
 - Last few centimetres per hand wheel
- Safety arrangements
 - End switches prevent any action while frame is locked
- Mounting points to the magnet
 - Adjustable in all directions

Setup of the new Cluster Source

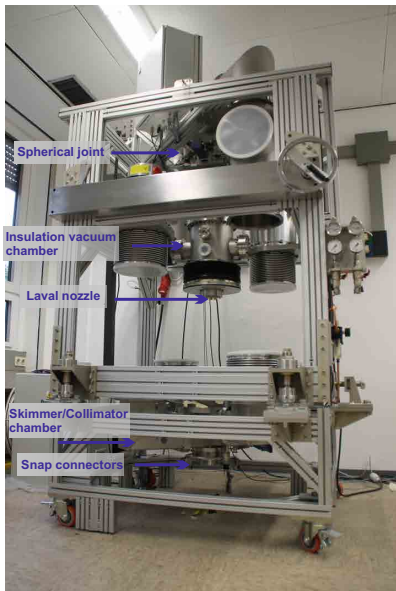


Setup of the new Cluster Source



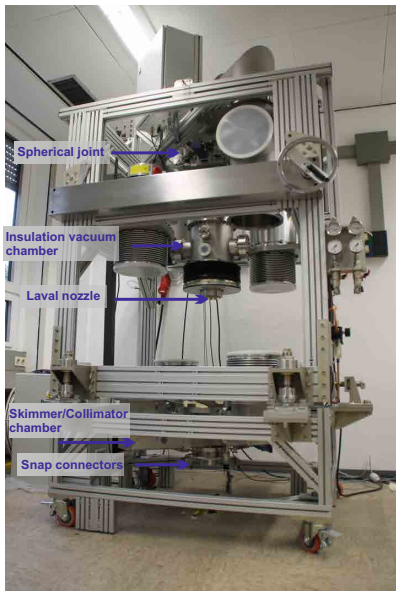
Spherical Joint

Setup of the new Cluster Source



Laval nozzle

Setup of the new Cluster Source

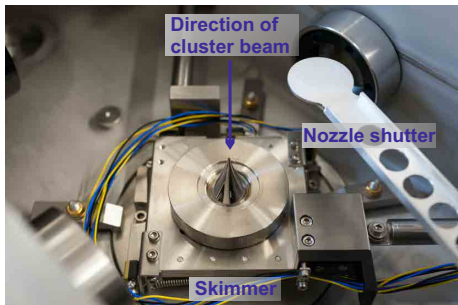


Skimmer/Collimator chamber

Setup of the new Cluster Source

Skimmer & Collimator chamber – xy-tables

- Skimmer and collimator installed on xy-table \Rightarrow position adjustable
- Adjustment via two stepper motor devices
- Electrical installation ongoing



Setup of the new Cluster Source

Skimmer & Collimator chamber – Camera ports

- Two camera ports on opposite sites
- Different objective lenses offer possibility to see:
 - Nozzle, beam and skimmer ($f = 28$ mm)
 - Detailed view of beam and skimmer tip ($f = 100$ mm)

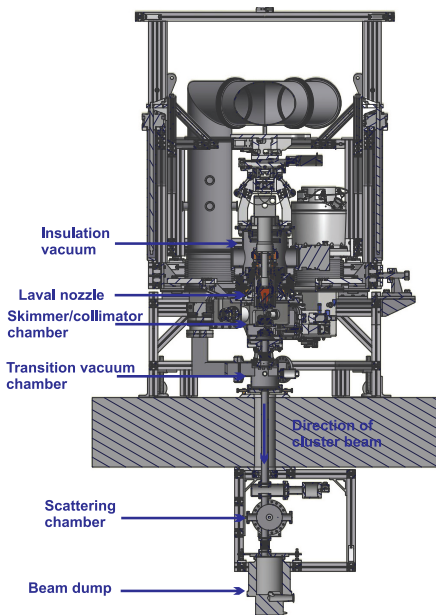


$f = 28$ mm



$f = 100$ mm

Vertical Setup



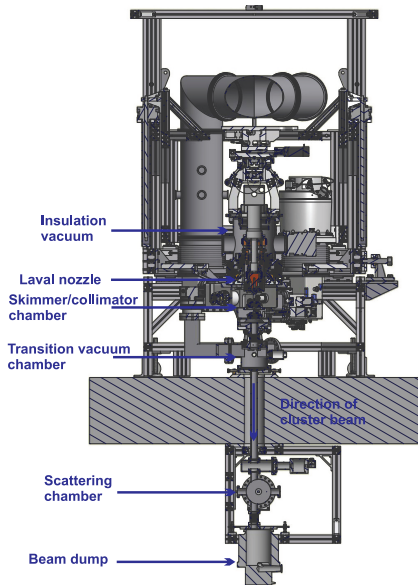
- Setup of cluster source in full \bar{P} ANDA geometry

⇒ Vertical setup

⇒ 2.1 m between cluster source and scattering chamber

Installation of further components

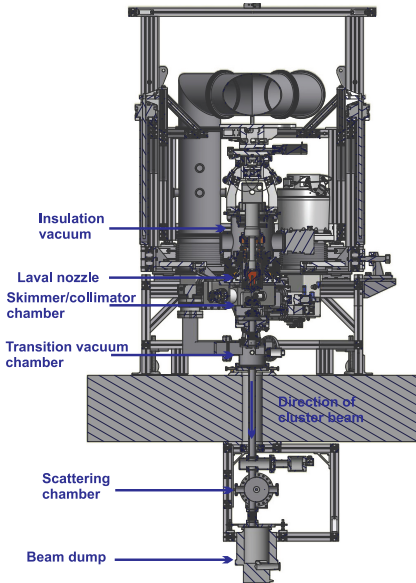
Transition Vacuum Chamber



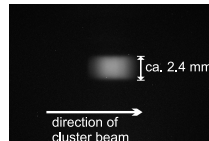
- Separates cluster target vacuum from HESR/ \bar{P} ANDA vacuum

Installation of further components

Transition Vacuum Chamber



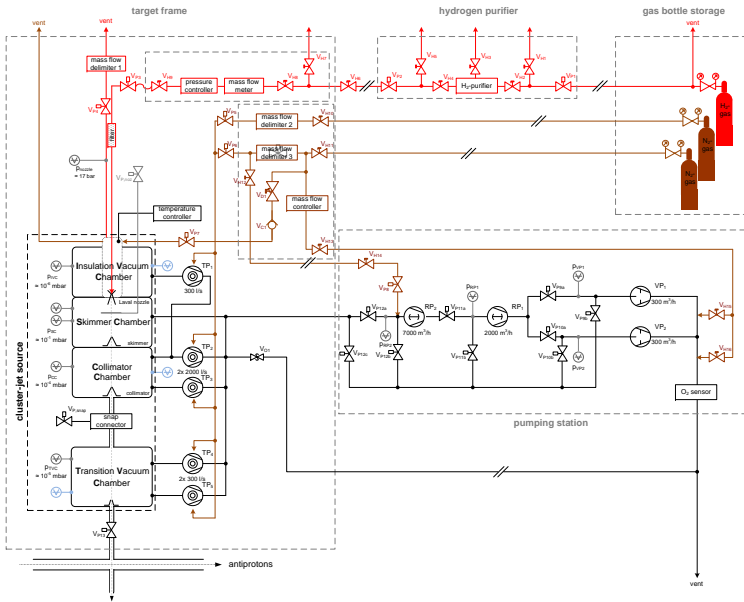
- Offers camera ports for online cluster beam position and thickness monitoring



Measurement principle at MCT1S target

Installation of further components

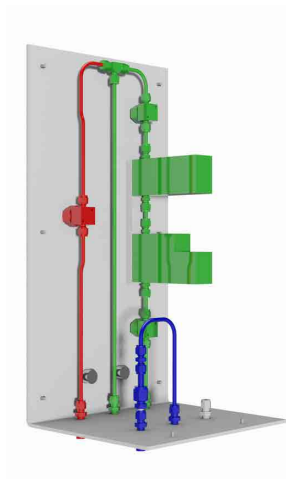
Gas system and gas control



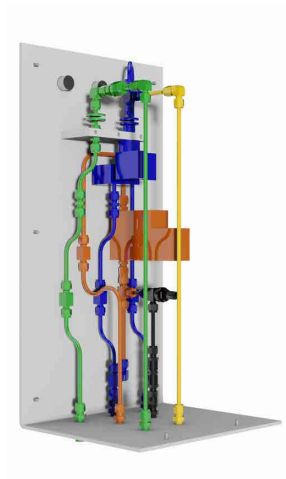
Installation of further components

Gas system and gas control

- Different modules for H₂ and N₂ systems



H₂

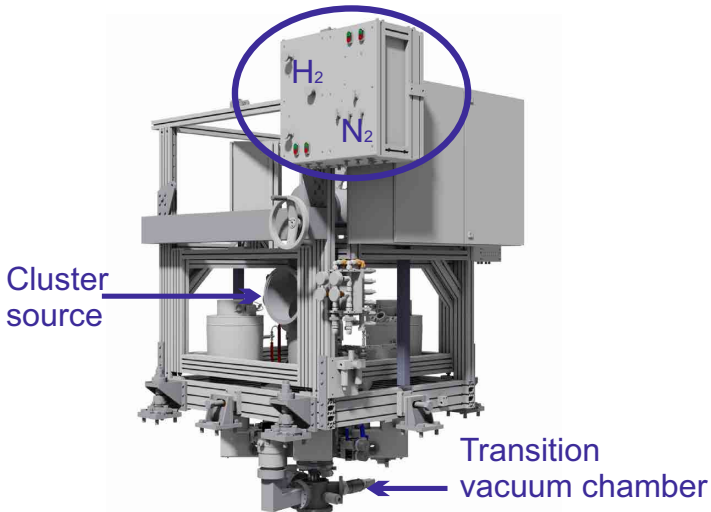


N₂

Installation of further components

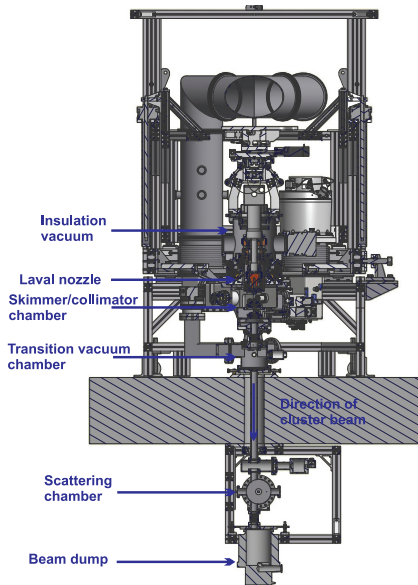
Gas system and gas control

- Installation at target support frame



Installation of further components

Scattering Chamber & Beam Dump

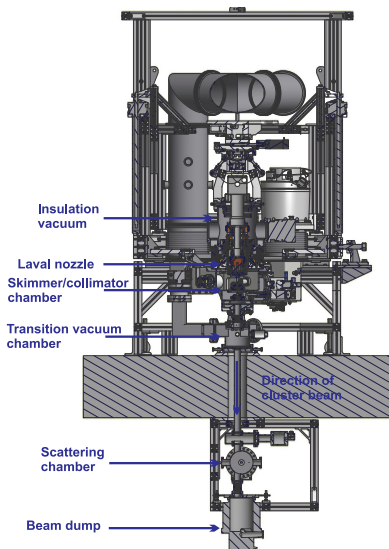


- Setup of a scattering chamber including a scanning rod system

- Installation of a provisional beam dump

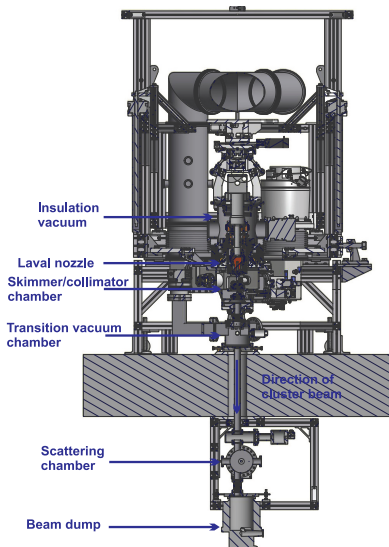
⇒ Test of cluster beam properties at \bar{P} ANDA interaction point in 2014

Setup of the cluster target → Next steps in 2014



- Final mounting of skimmer/collimator xy-tables and electrical installation
- Integration of snap connectors & transition vacuum chamber
- ⇒ Final Setup of the cluster source
- Setup of the onboard gas system
- Installation of the final pumping station in the new laboratory
- ⇒ Integration with the cluster source
- Installation of vertical beam pipes
- Setup of scattering chamber and beam dump
- Setup of final electronic rack & (temporary) slow control system for test operation

Setup of the cluster target → Implementing & Tests

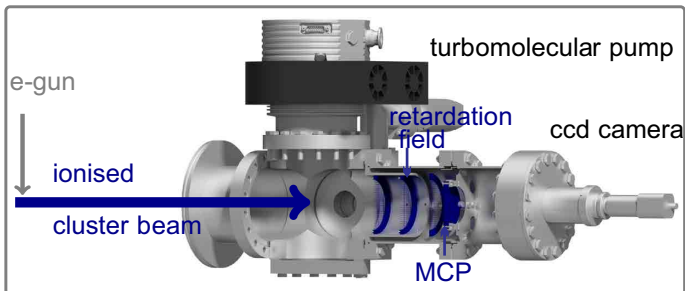


- Tests of the vacuum conditions
- Test of mounting system
- Test of the slow control requirements
- Gas supply requirement tests
- Investigation of the target thickness
- Determination of the best settings of skimmer, collimator and spherical joint
- Long term beam stability tests
- Test of different Laval nozzles
- ...

Further Studies

Mass Measurements with MCPs

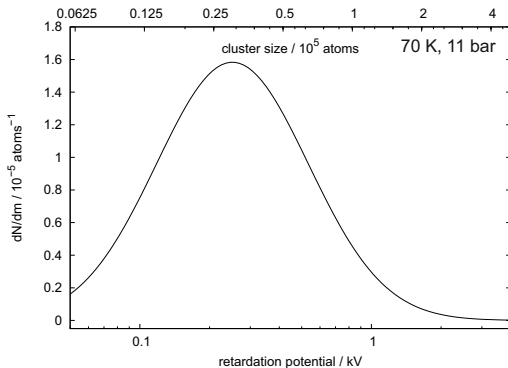
- Mass measurements at the target prototype (E. Köhler)
- Cluster beam ionised by an e-gun
- Clusters are stopped by a retardation field



Further Studies

Mass Measurements with MCPs

- Measurement of transmission spectra
- Stopping of light clusters successful (retardation field ≤ 4 kV)
- Cluster mass described by log normal distribution
- Measurements between 50 – 80 K, 7 – 12 bar $\Rightarrow 10^5$ atoms
- Lower temperatures lead to higher masses



Status of the Cluster-Jet Target for PANDA

- Design and construction of complete cluster target ongoing
 - Cluster source integrated in support frame
 - Skimmer/collimator xy-tables ready for mounting
 - Setup of gas system ongoing
 - Construction of transition vacuum chamber
 - Construction of scattering chamber and beam dump

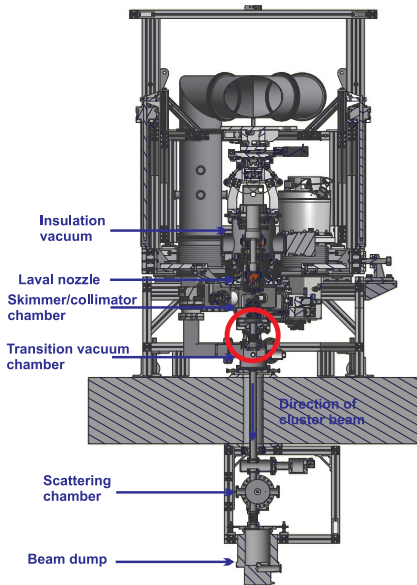
⇒ Implementing and tests

Further Studies

- Investigations on the cluster mass with MCP's
- Determination of the cluster size by Mie-scattering

Installation of further components

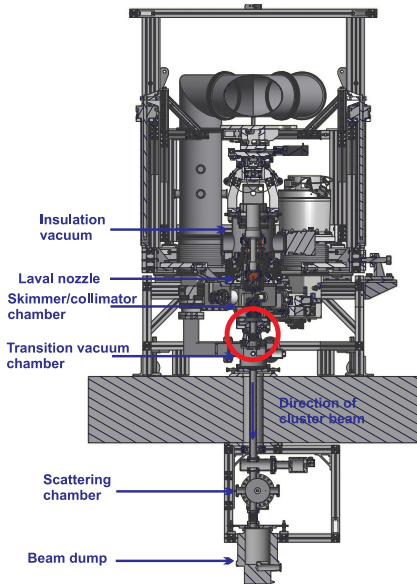
Snap Connectors



- Connection to the magnet vacuum system

Installation of further components

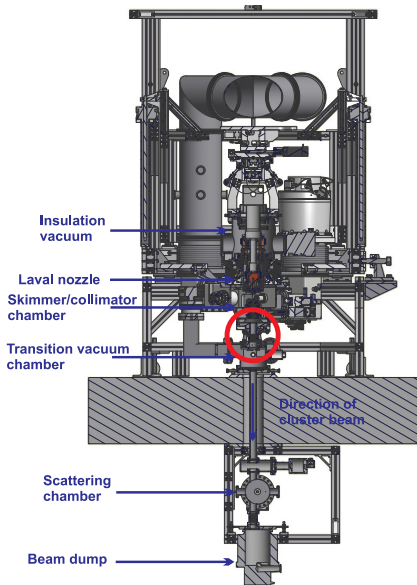
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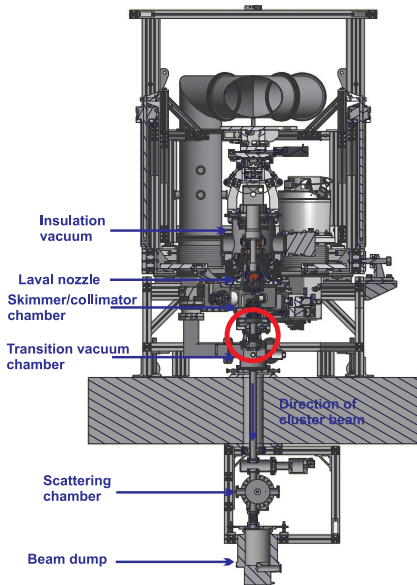
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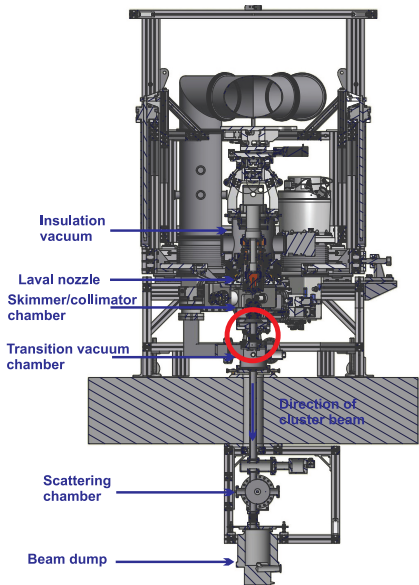
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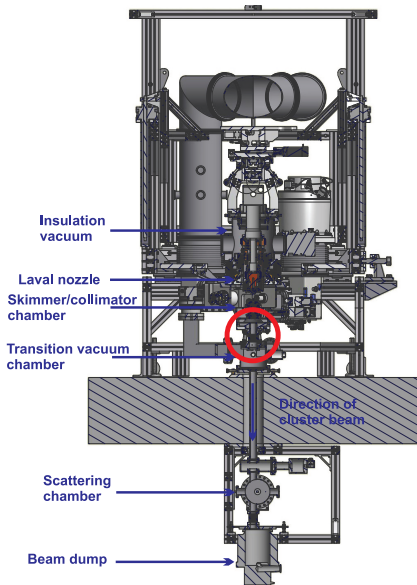
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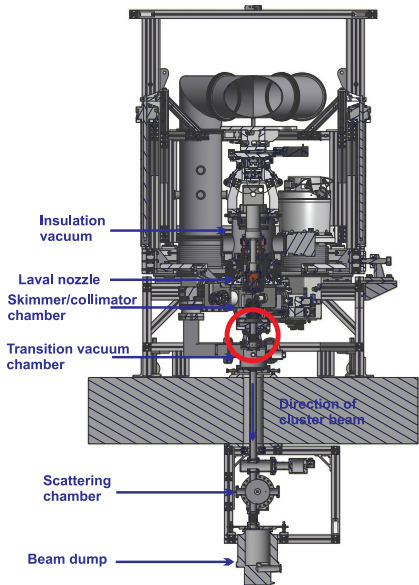
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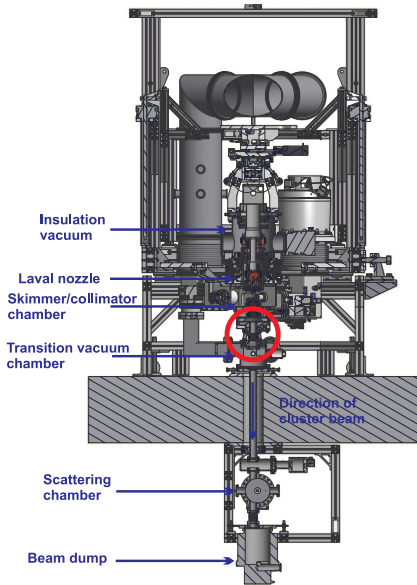
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Installation of further components

Snap Connectors



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