# Debris protection of vacuum target chamber for plasma experiments at FAIR

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Seventh International EMMI Workshop on Plasma Physics with Intense Heavy Ion and Laser Beams at FAIR December 9-10, 2014, Moscow, Russia



#### **Plasma Physics Experiments Proposed at FAIR**

Heavy Ion Heating and EXpansion LAboratory PLAnetary Science



Warm Dense Matter by dynamic confinement



#### **Proton radiography** of fast dynamic processes







## **Present Target chamber in HHT cave at GSI**







# Technical Report for the Design, Construction and Commissioning of the Target Chamber for Plasma Physics Experiments



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# **Debris protection: high speed fragments**



#### Beam energy E ~100 kJ, m – mass of the target

About 60-80% energy of the beam is converted to kinetic energy of the target

 $Mu^2/2 = E$  - simple expression could be used for estimates

Typical target mass ~ 10 g, several fragments => its dimensions ~ 1 mm, speed ~ 1 - 4 km/s





## **Spaceship objects: AI shield, AI impactor**



# **Debris protection: crater depth**



# **Debris protection of walls: possible construction**



vacuum gap 1-2 mm between shields





## **Optic flange damaged by target fragments**

Beam energy 0.06 kJ



velocity of target expansion < 2 km/s





# **Debris protection of optic ports**



# **Debris protection of optic ports**



### **Unprotected entrance port**

present chamber in HHT cave







### **Debris protection of entrance port**



# THANK YOU FOR

# **ATTENTION !**