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CBM beam pipe: status

Anna Senger

Outline

- FLUKA beam simulations
- Beam pipe in the STS and RICH/MUCH region
- Possible concept of the beam pipe from target chamber to beam dump
- Conclusions and next steps

FLUKA

"The FLUKA code: Description and benchmarking" G. Battistoni, S. Muraro, P.R. Sala, F. Cerutti, A. Ferrari, S. Roesler, A. Fasso`, J. Ranft, Proceedings of the Hadronic Shower Simulation Workshop 2006, Fermilab 6--8 September 2006, M. Albrow, R. Raja eds., AIP Conference Proceeding 896, 31-49, (2007)

"FLUKA: a multi-particle transport code" A. Fasso`, A. Ferrari, J. Ranft, and P.R. Sala, CERN-2005-10 (2005), INFN/TC_05/11, SLAC-R-773

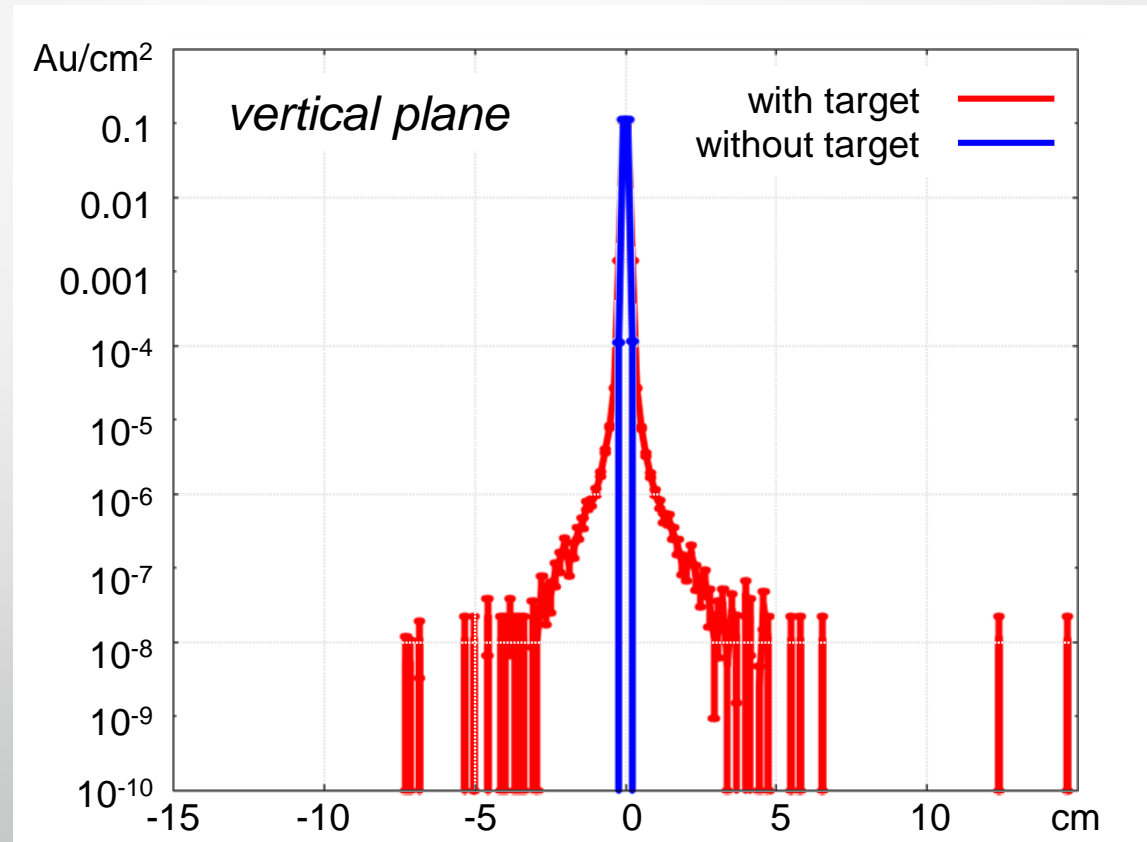
FLAIR

V.Vlachoudis *"FLAIR: A Powerful But User Friendly Graphical Interface For FLUKA"* Proc. Int. Conf. on Mathematics, Computational Methods & Reactor Physics (M&C 2009), Saratoga Springs, New York, 2009

Beam properties: Divergence versus multiple scattering in the target

SIS100 beam parameters
at target:
 $dx = 0.6 \text{ mm}$
 $dy = 0.6 \text{ mm}$
divergence 1.7 mrad

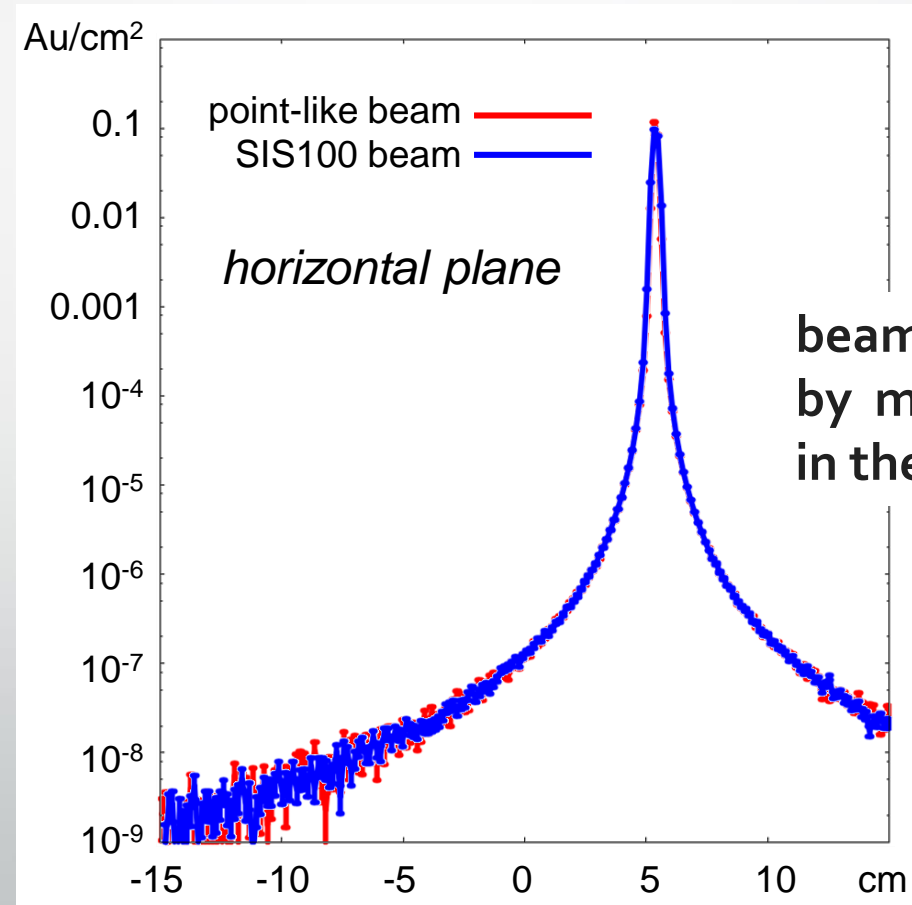
*Au beam @ 10 AGeV + 250 μm Au target
1.5 m from the target*



Beam properties: Divergence versus multiple scattering in the target

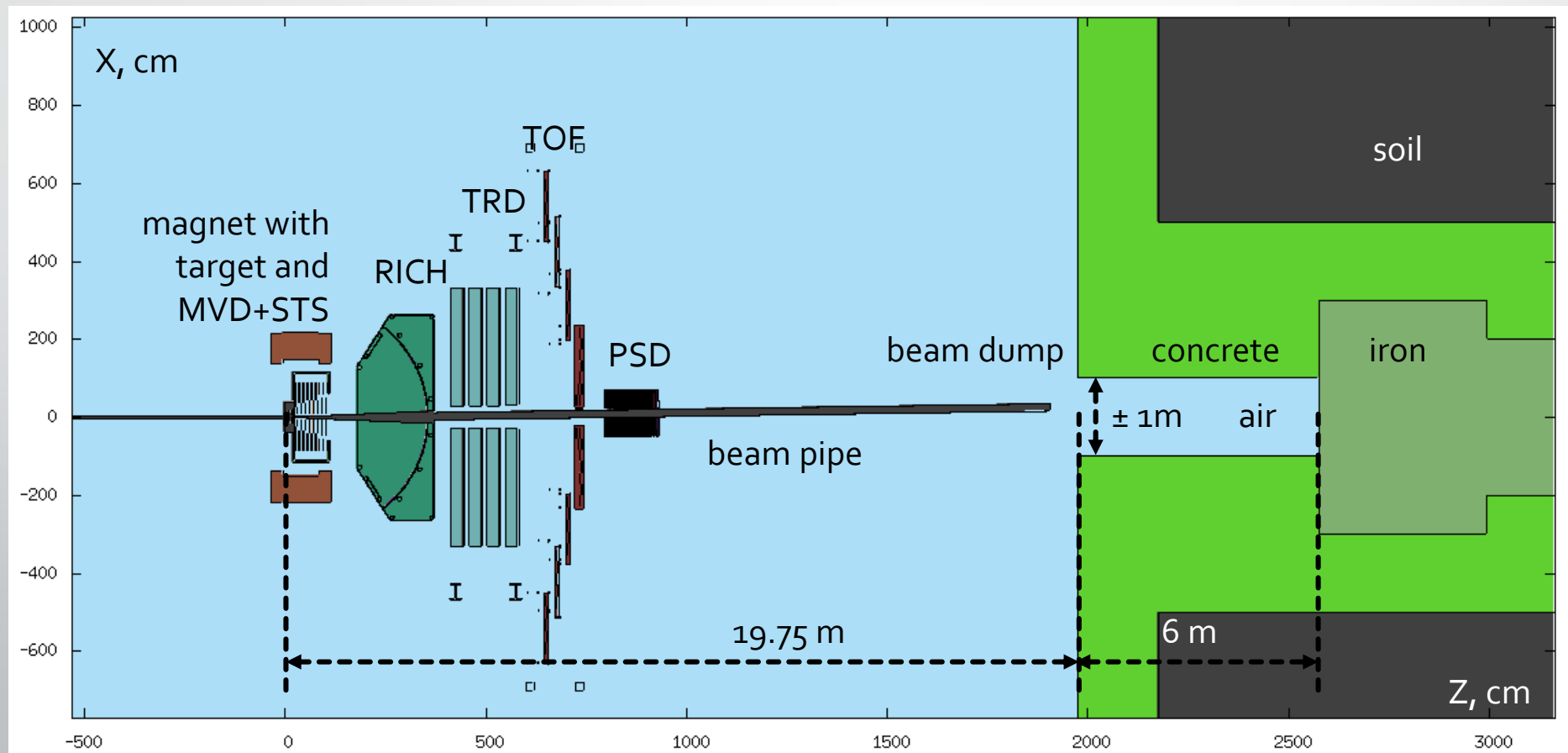
SIS100 beam parameters
at target:
 $dx = 0.6 \text{ mm}$
 $dy = 0.6 \text{ mm}$
divergence 1.7 mrad

*Au beam @ 2 AGeV + 250 μm Au target
1.6 m from the target*

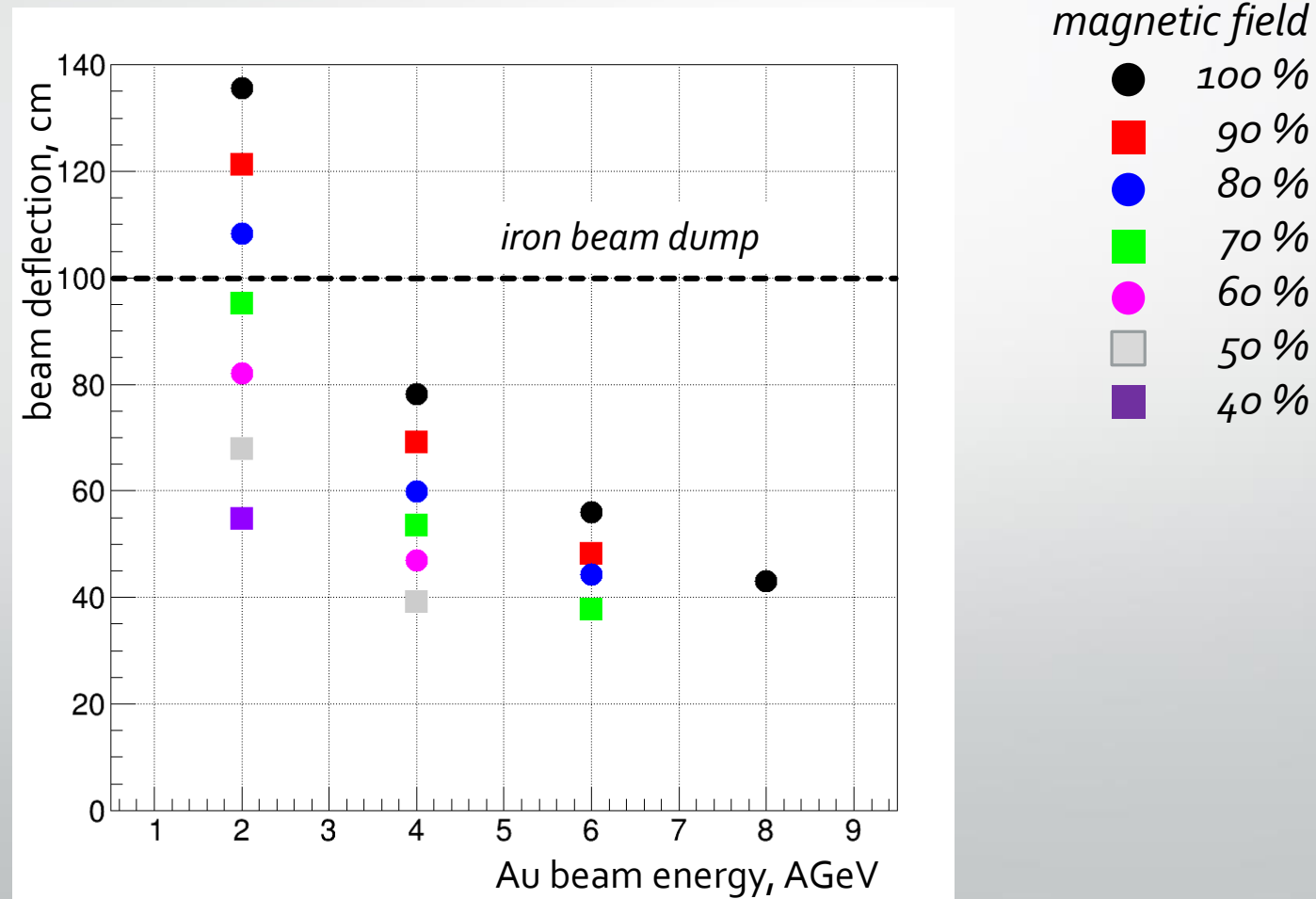


**beam profile dominated
by multiple scattering
in the target**

CBM cave (electron setup in FLUKA)



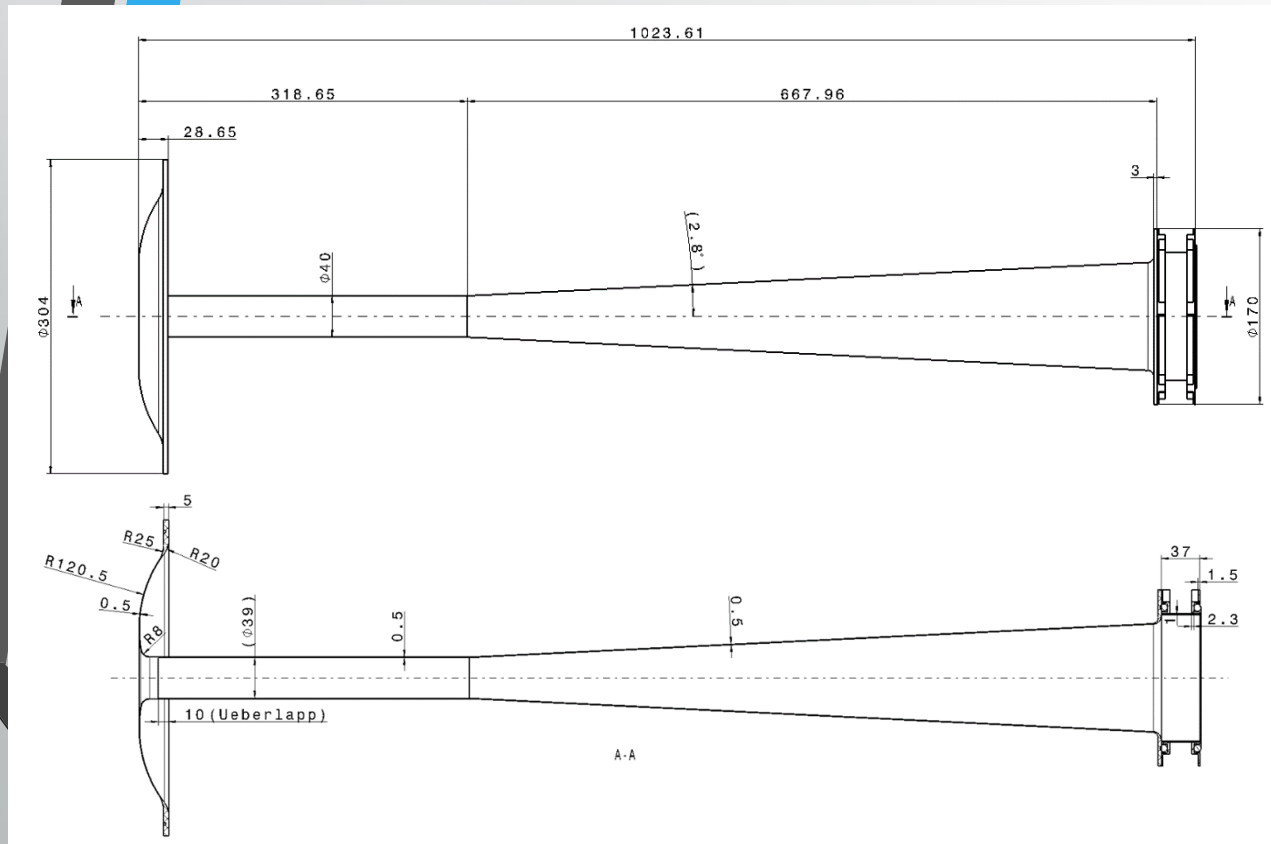
Au beam in iron beam dump



CBM beam pipe concept

- fixed (unmovable) part in STS-MUCH/RICH region
- movable part in TRD-TOF-PSD according to beam deflection
- bellow system between fixed and movable parts

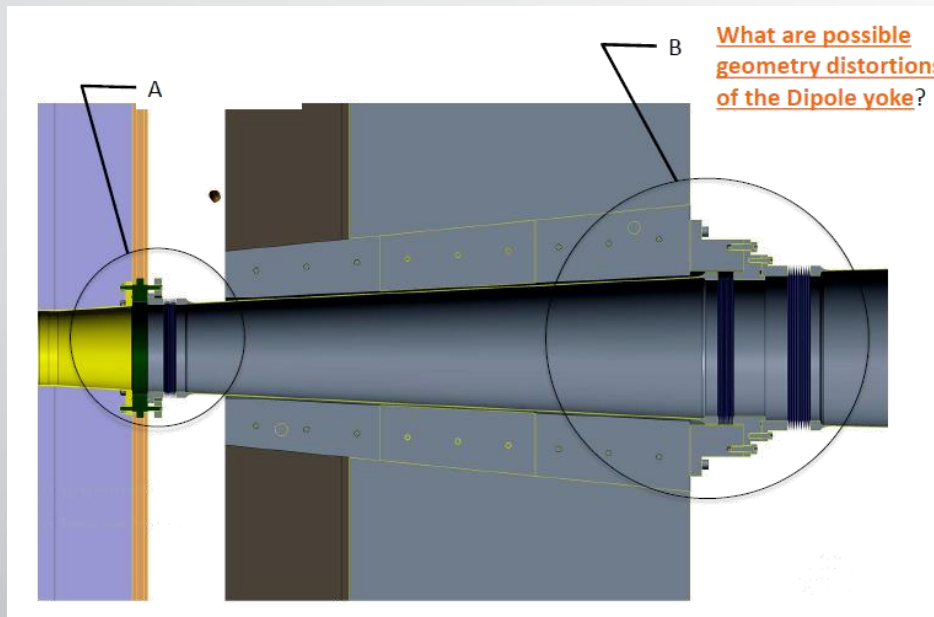
STS beam pipe proposal: mechanical design



Specifics:

- inside STS box
- low budget material to avoid conversion
- integration with target box
- integration in detector structure
- connection with downstream part of beam pipe

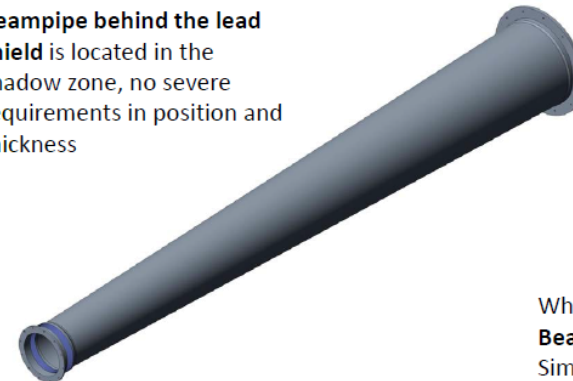
Beam pipe in MUCH



Specifics:

- inside heavy absorbers
- integration in detector structure

Beampipe behind the lead shield is located in the shadow zone, no severe requirements in position and thickness



What are the requirements for a Beampipe inside the lead shield ??
Simulations are needed

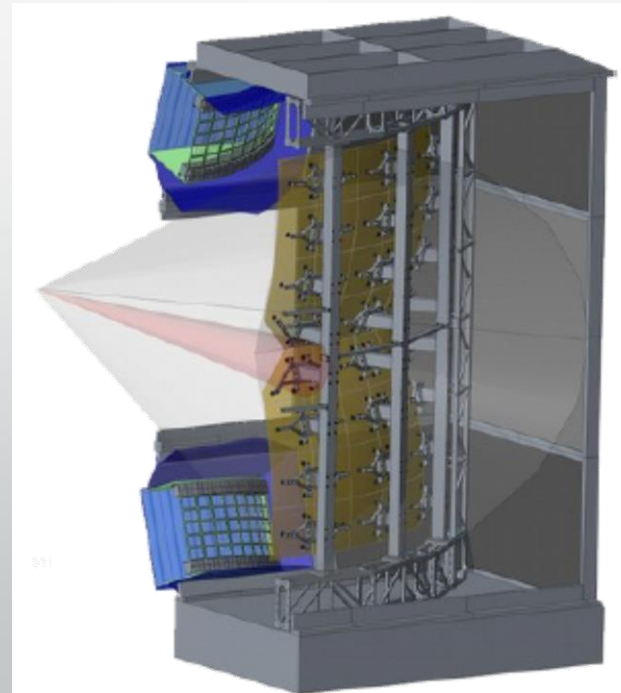
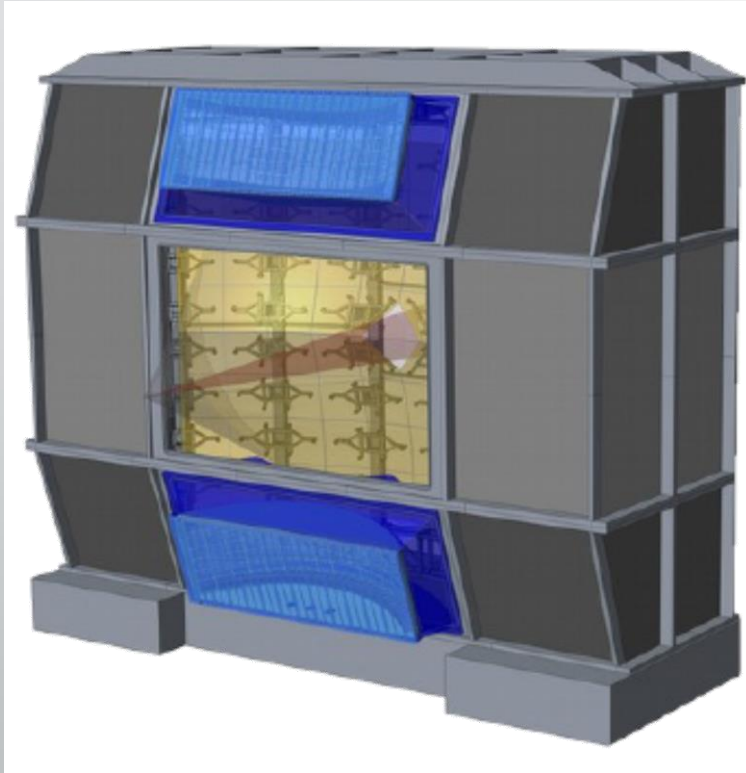


*Volodia Nikulin, PNPI,
28th Collaboration Meeting, Tübingen Germany*

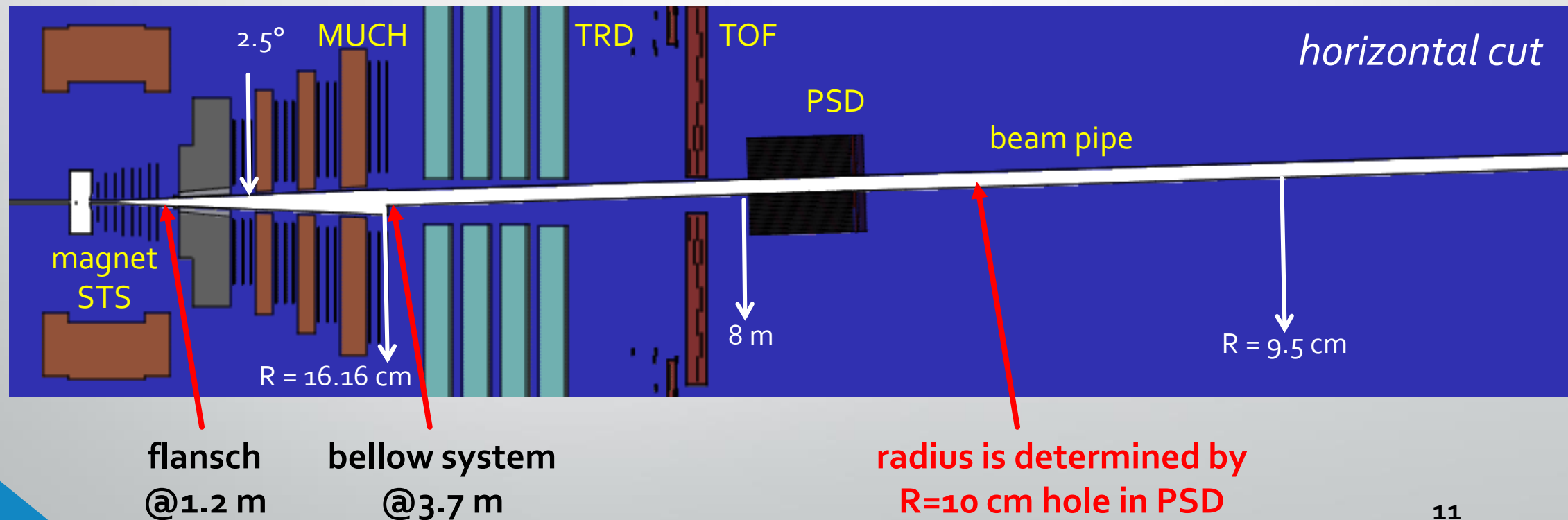
Beam pipe in RICH

Specifics:

- inside gas box
- low budget material to avoid conversion



Beam pipe proposal

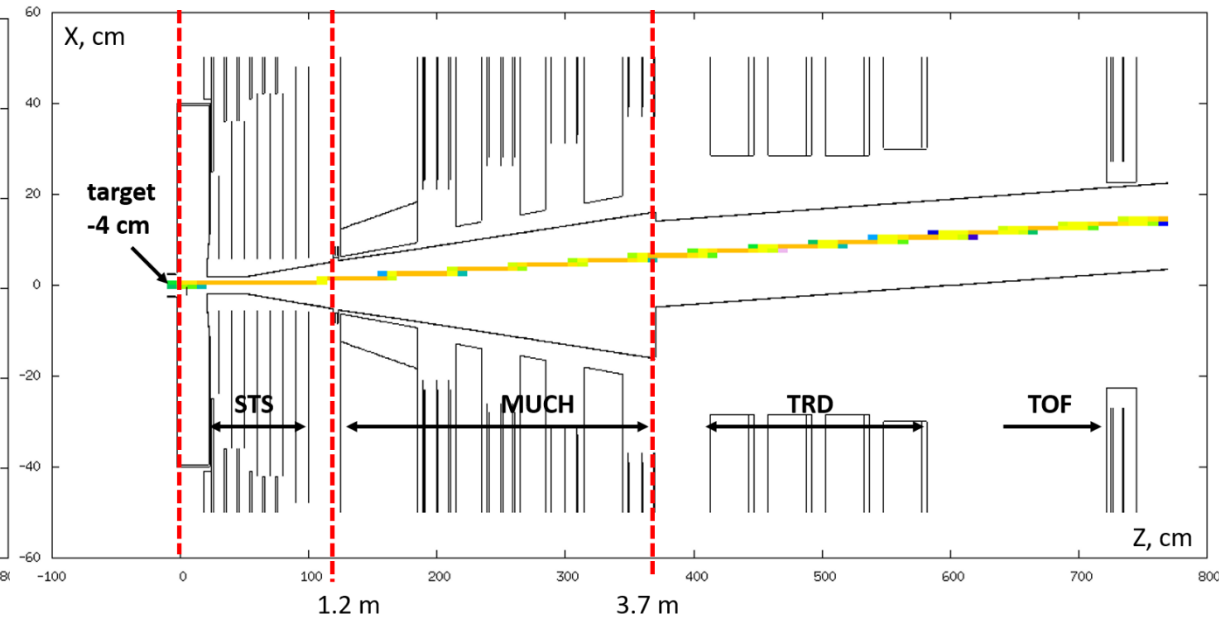
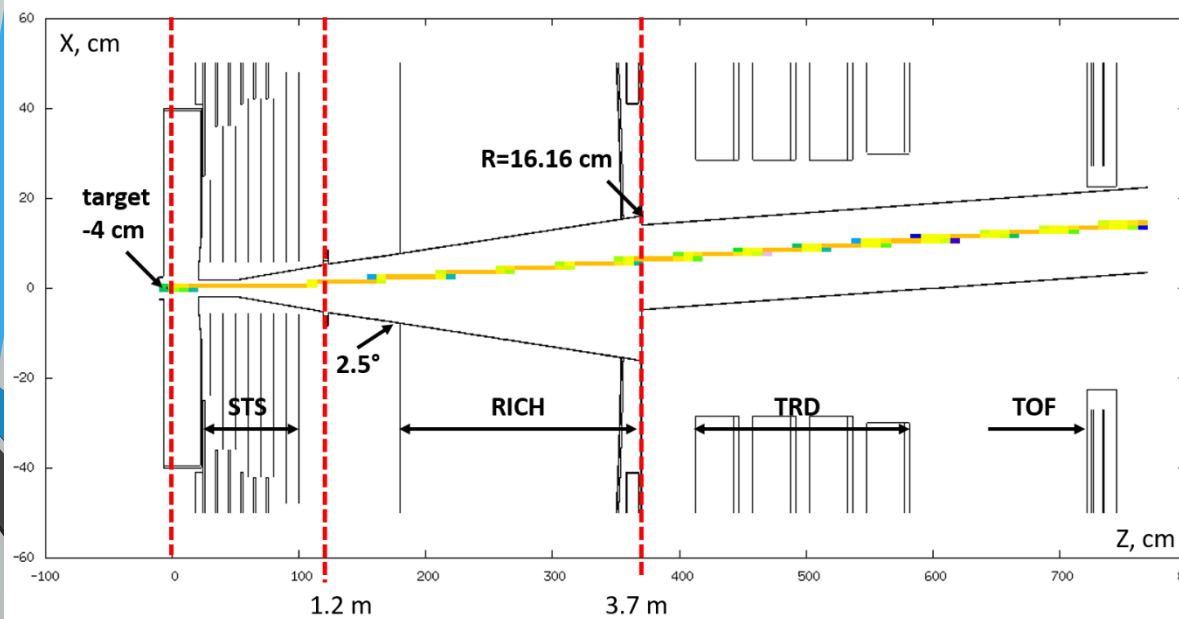


Beam in MUCH-RICH region (FLUKA)

Au beam @ 4 AGeV, 60% magnetic field

Electron-setup

Muon-setup



Conclusions and next steps

- The fixed (unmovable) part of the beam pipe could be designed by detector groups (STS, MUCH and RICH) taking into account detector properties and physics performance.
- The beam hole in the PSD has to be finally determined. The minimum radius of the movable beam pipe is 10 cm.
- The wall thickness and material of the movable pipe has to be optimized taking into radiation background.