

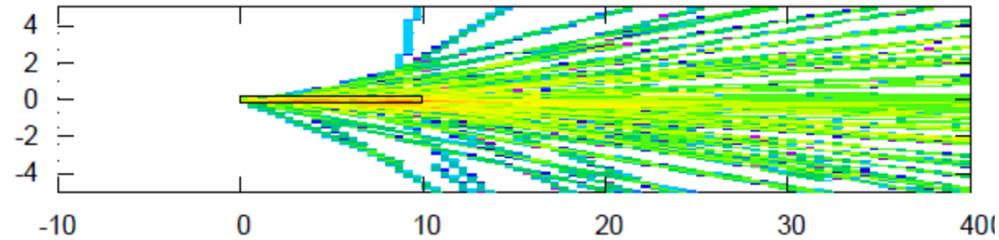
Antiproton Target Area and Antiproton separator

U. Weinrich

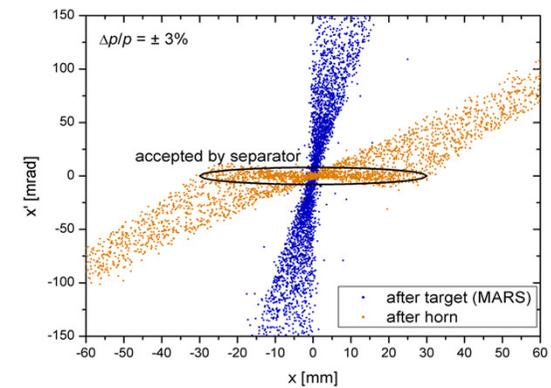
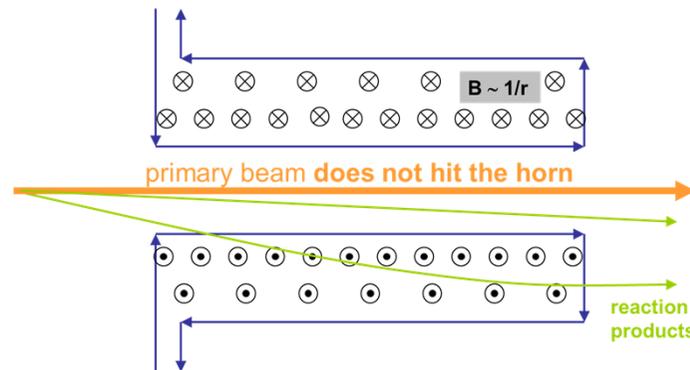
HIC4FAIR Workshop Hamburg, 29 July 2015

Principle of anti proton target and separation

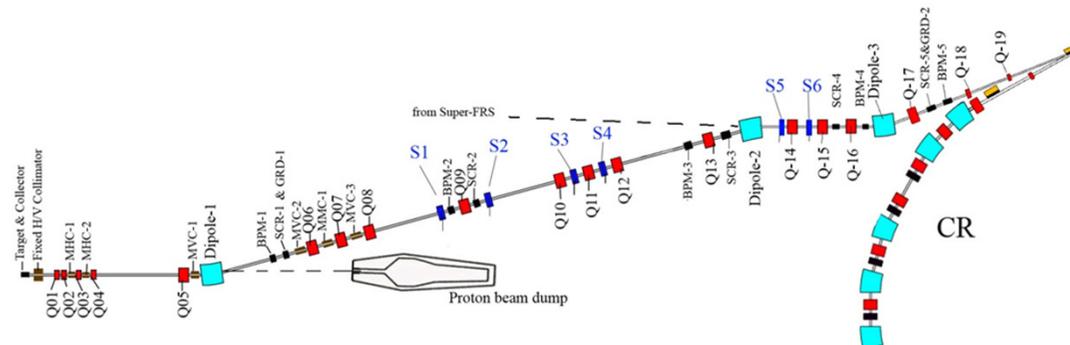
Shoot protons on target and create antiprotons



Focus antiprotons with magnetic horn



Separate protons to dump and antiprotons to CR



Remarks to project perspectives

The Antiproton Target and Separator are

- within the scope of MSV 0-3
- not within the scope of 11@22 strategy
- not within the 1st stage of realisation given by actual financing

The following scenarios are possible:

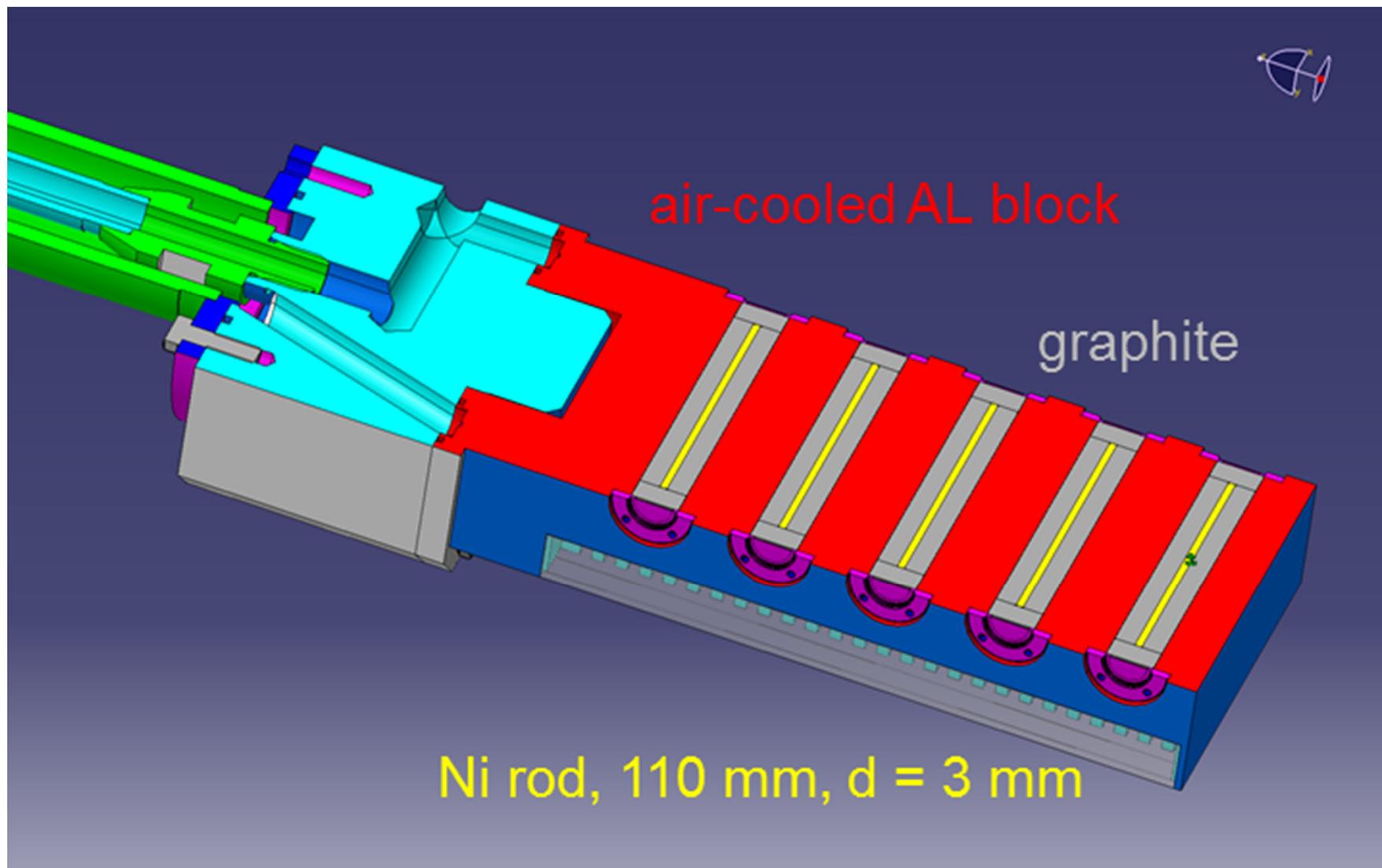
1. The system will not be built at all
2. The system will be built with no RESR in the scenario
3. The system will be built with RESR in the scenario
4. The system will be built with RESR and upgraded to 5s cycle time

Beam parameter

Scenario independent beam parameter	Full MSV
Energy of incoming protons	29 GeV
Protons per pulse	2×10^{13}
Pulse duration	50 ns
Energy of collected antiprotons	3 GeV
Energy acceptance separator	$\pm 3 \%$
Transverse acceptance separator	240π mm mrad

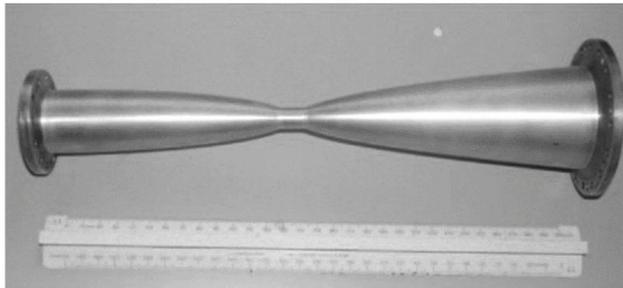
Scenario specific beam parameter	No RESR	RESR	RESR, 5s
Cycle time	10s	10s	5s
Average proton rate during accumulation	$2 \times 10^{12}/s$	$2 \times 10^{12}/s$	$4 \times 10^{12}/s$
Accumulation time / operation time	$\sim 1/8$	1	1
Average proton rate in operation	$2.5 \times 10^{11}/s$	$2 \times 10^{12}/s$	$4 \times 10^{12}/s$

Target

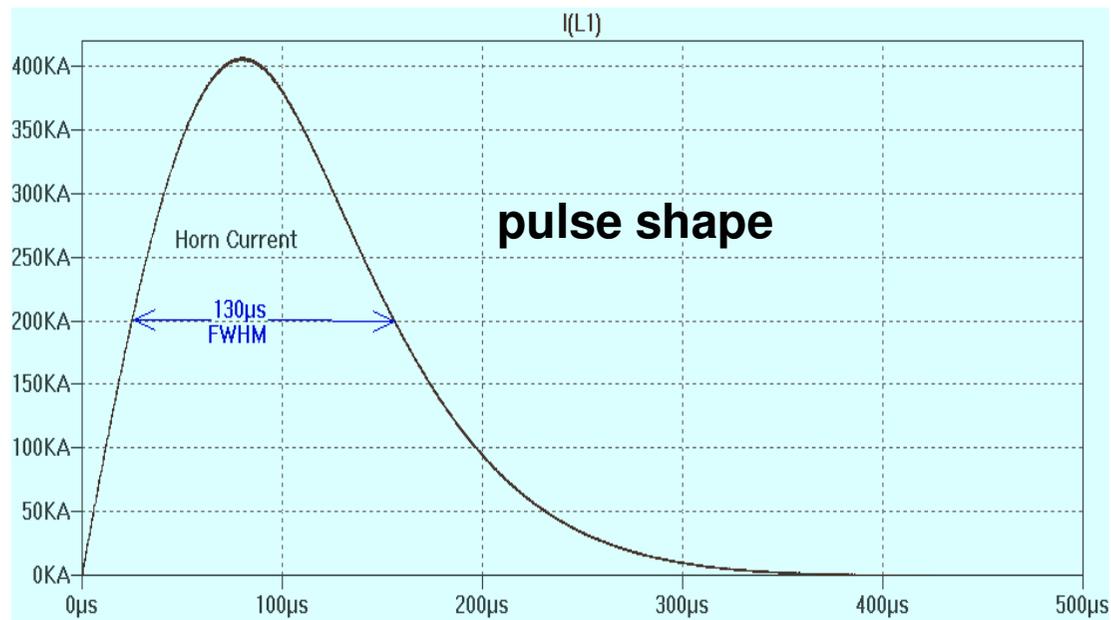
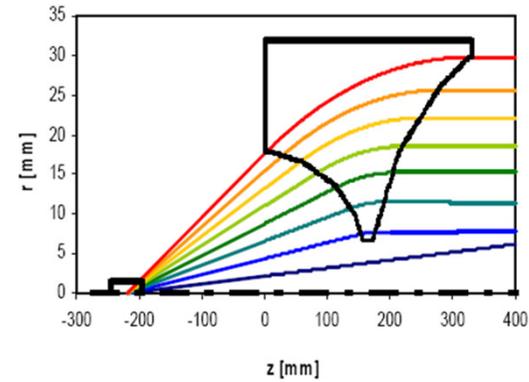


Magnetic Horn

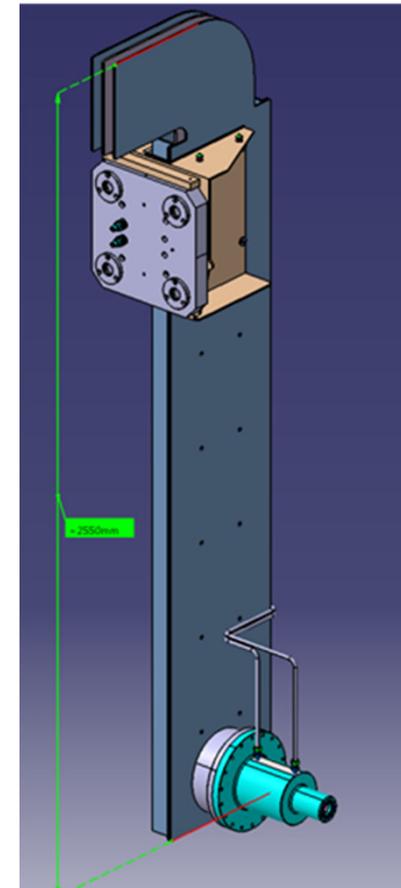
CERN AD Horn: Inner Conductor



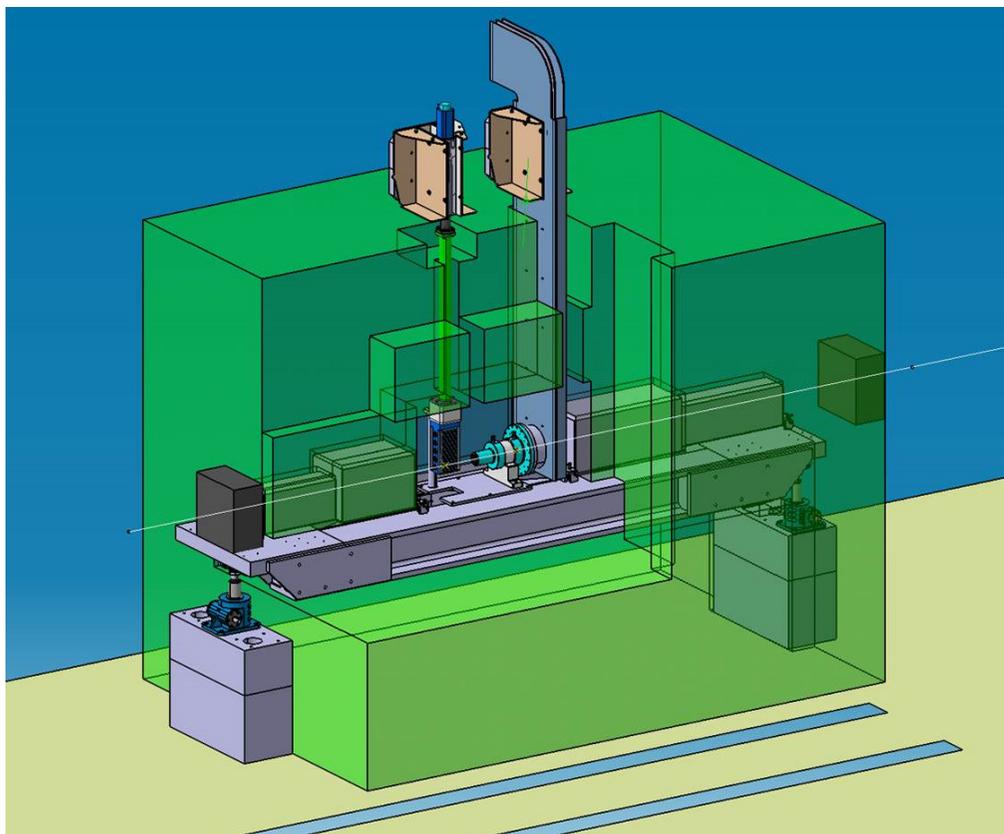
$I = 400 \text{ kA}$



support structure

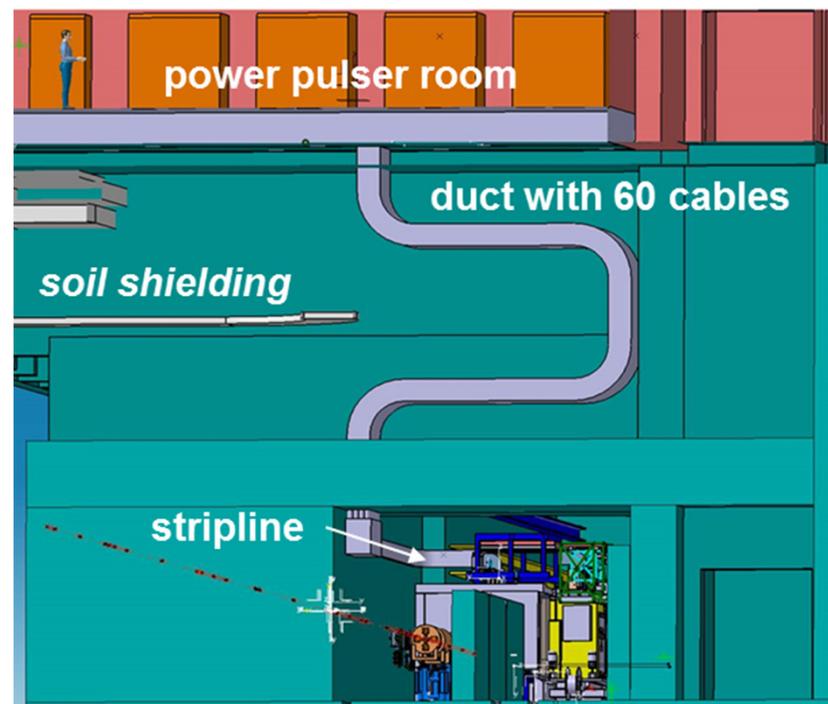


Target Area and power transmission



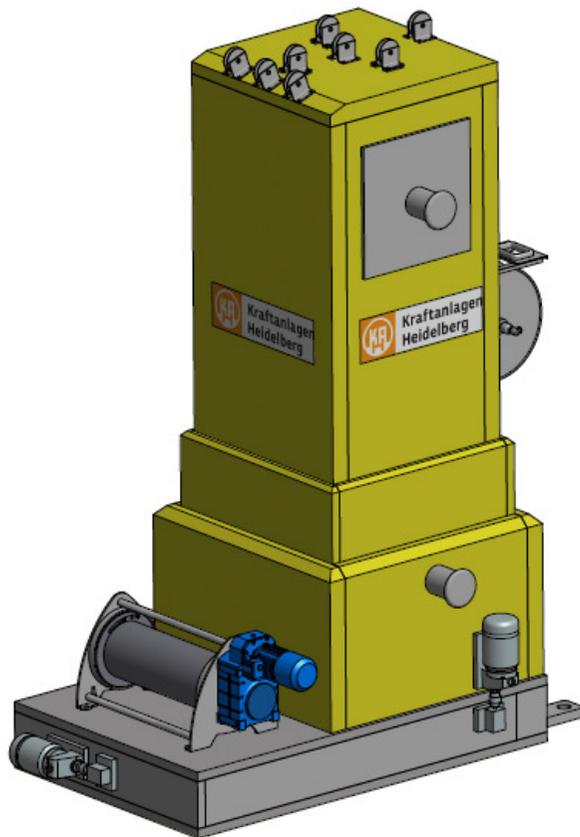
shielded target area

**power transmission
to magnetic horn**

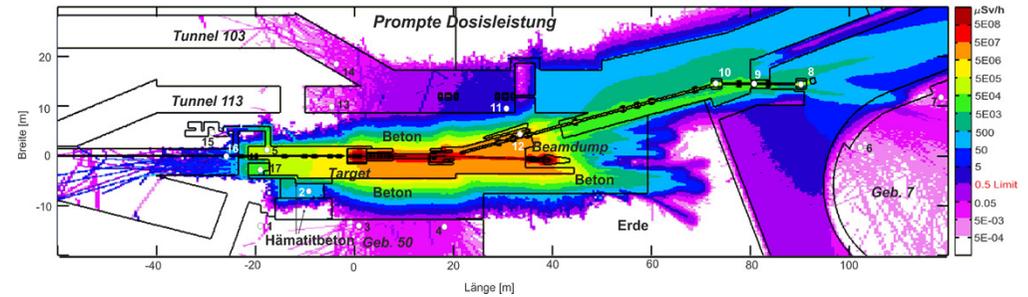


Separation and shielding

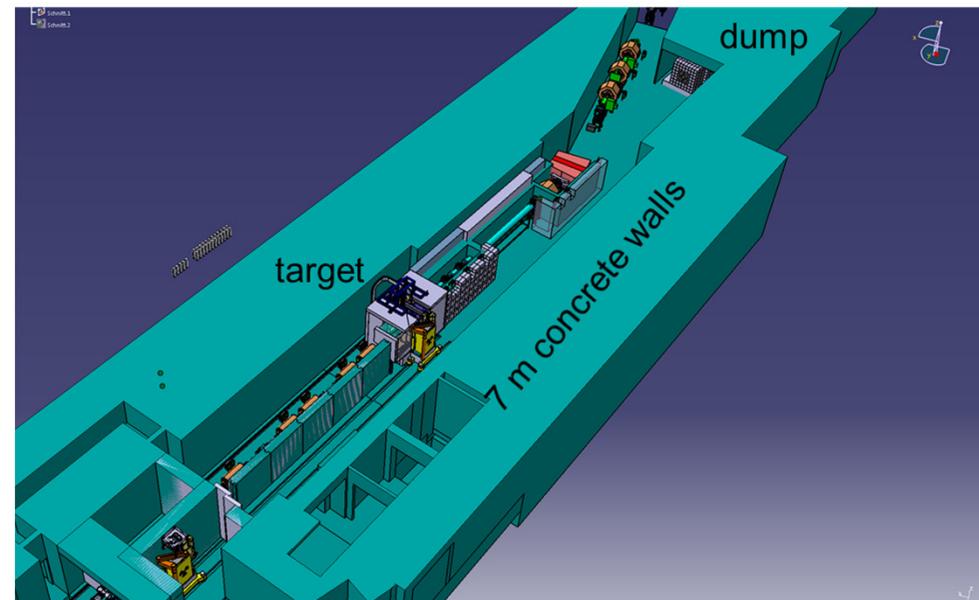
transport box for activated horn and target



FLUKA calculations



building layout



Cost saving scenario in bulding

Without RESR the average proton losses in the target-, separator- and beam dump areas will be about one order of magnitude less than foreseen in the „Errichtungsgenehmigung“.

Corresponding measures in the radation protection could be:

1. reduction of concrete shielding thickness by 1m or
2. reduction of iron shielding thickness by 0.3m or
3. replacement of concrete shielding by earth shielding or
4. replacement of hematite concrete shielding by normal concrete shielding

There is now a FLUKA calculation based, draft layout of the building to benefit from the above mentioned options for the start version while keeping the „Errichtungsgenehmigung“ valid and keeping the option for later upgrade to full shielding capacity open!

Thank You for your attention

**and many thanks to Klaus Knie and his team
for all the detailed layout done so far!**