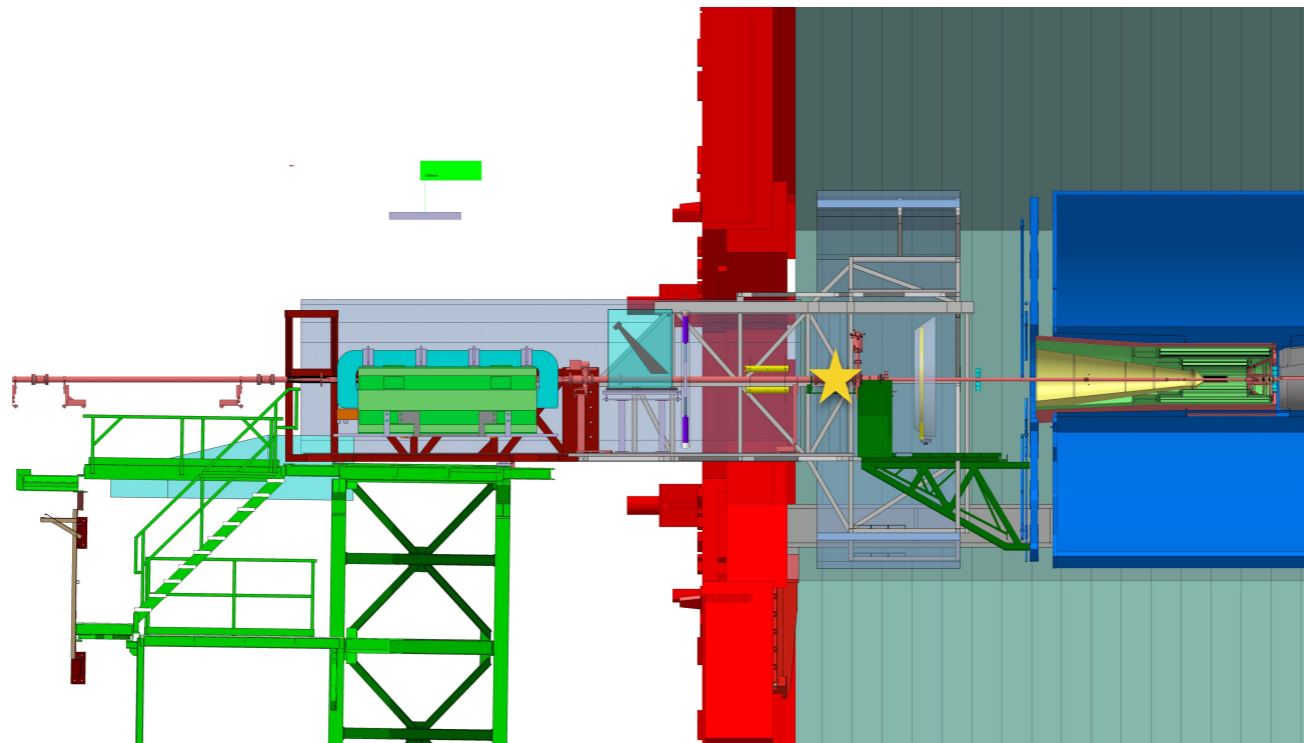


ALICE-FT status and plans

Cynthia Hadjidakis

ALICE Fixed target news and plans

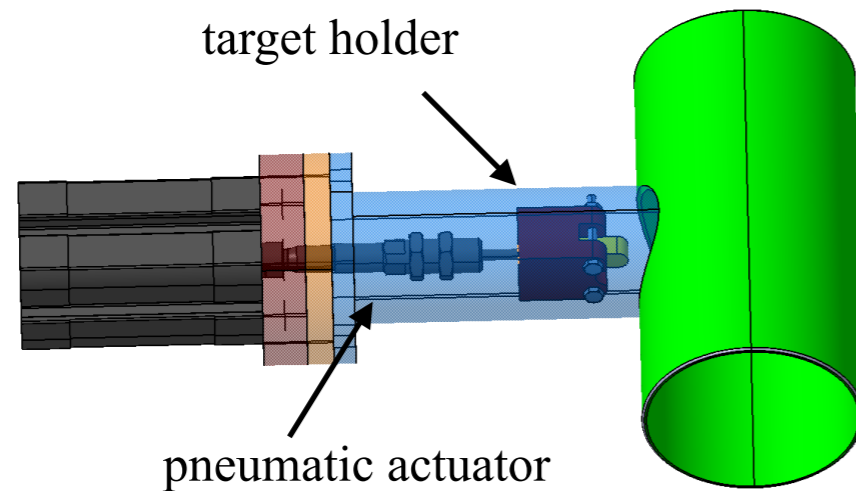
- Solid target in front of ALICE detectors coupled to a bent crystal located upstream the experimental cavern :
 - possible integration at $z \sim -4.8$ m from IP2 before an existing valve inside L3 magnet
 - first design: pneumatic motion system (magnetic field)



- Ongoing/todo tasks:
 - First crystal layout by Francesca Galluccio: need to pursue the studies on bent crystal (layout, deflected beam intensities crystal impedance), also within the LHC collimation team → Alex Fomin / Marcin Patecki
 - Target design study (thermal study, geometry and motion system: 1 working position so far, not compatible with beam optic modification within a year) → next slides
 - Study of valve impact on FoCal detector (both projects target LS3 and in similar location) → next slides
 - Study of ALICE TPC tracking performances for displaced vertices and perform realistic simulation → next slides
 - Other LHC related studies: vacuum (~2 years for the target) and impedance (~6 months for the target)
 - SPS test beam with UA9: particle production and expected signal on timepix

Target design

K. Pressard IJCLab Orsay



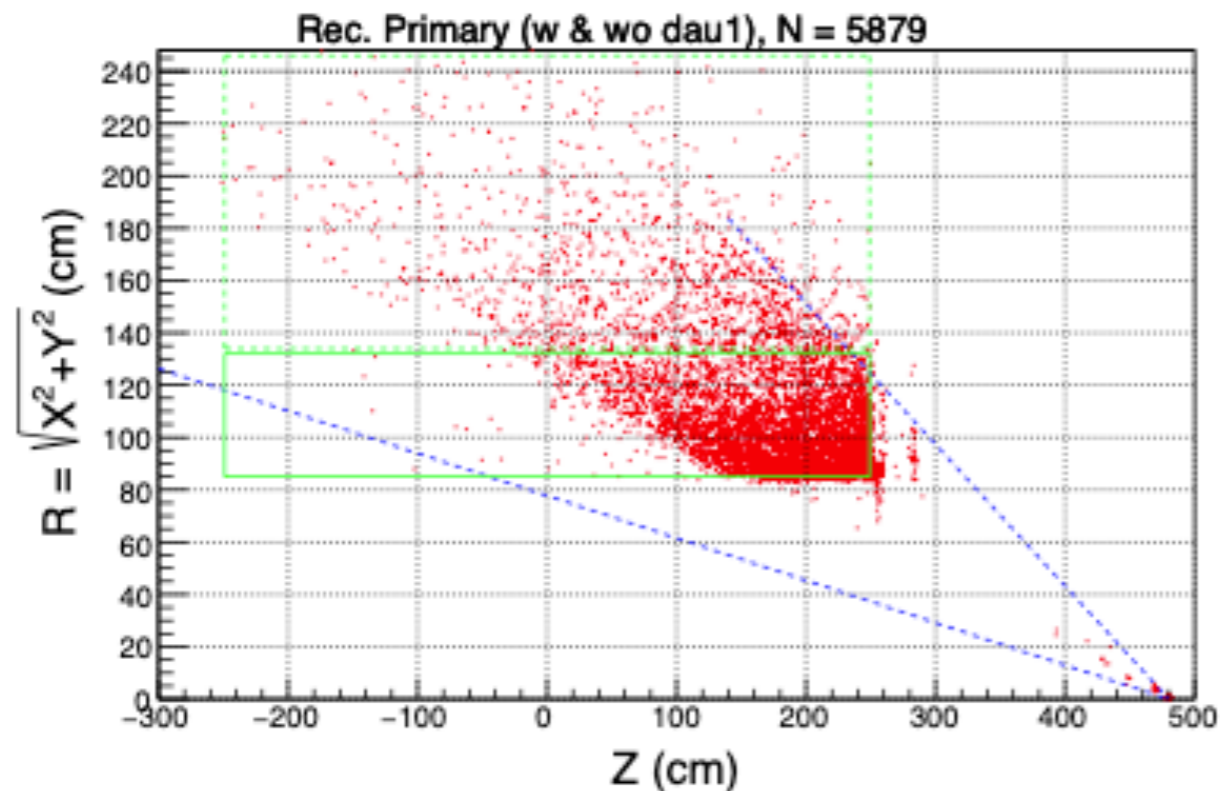
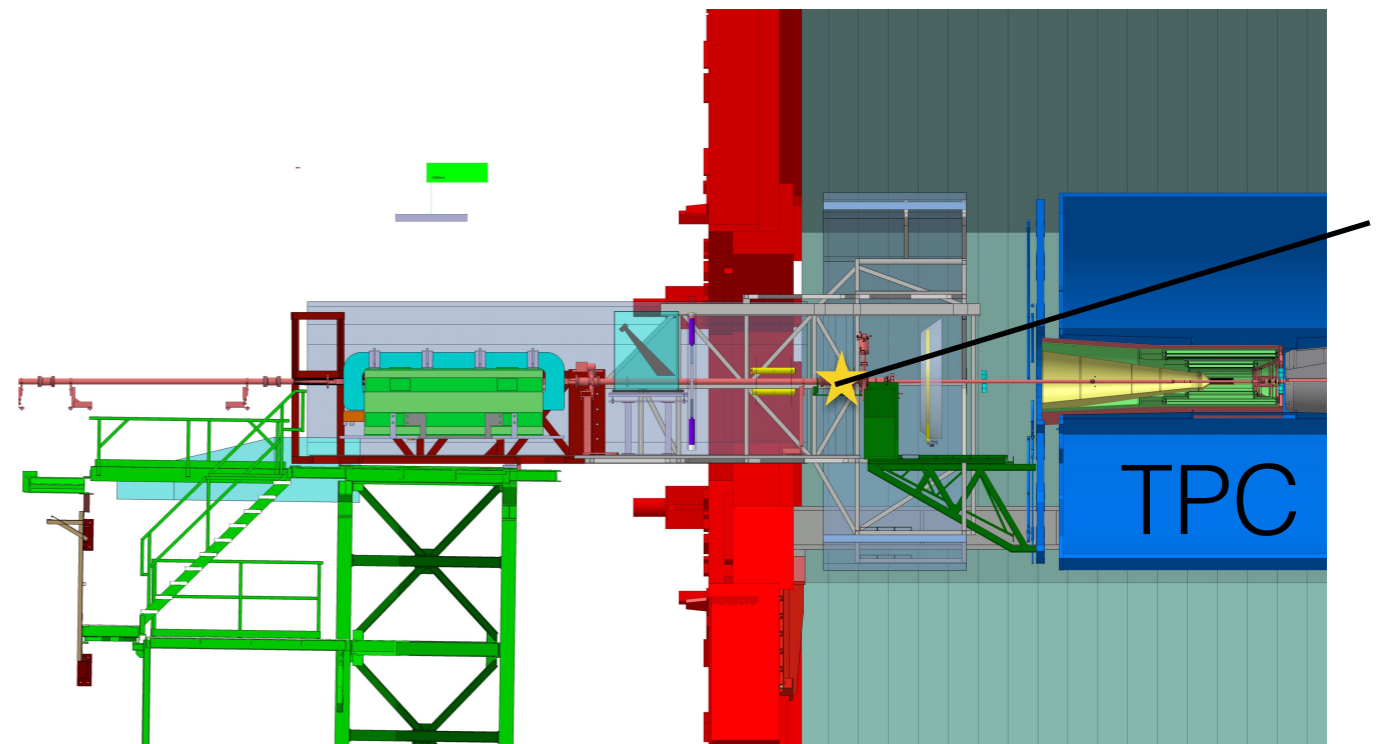
Studies by Kevin Pressard:

- first design: pneumatic motion system
- preferable to have linear movements with 5 μm resolution due to beam optic modification within a year \rightarrow electrical motorisation with motor outside of magnetic field

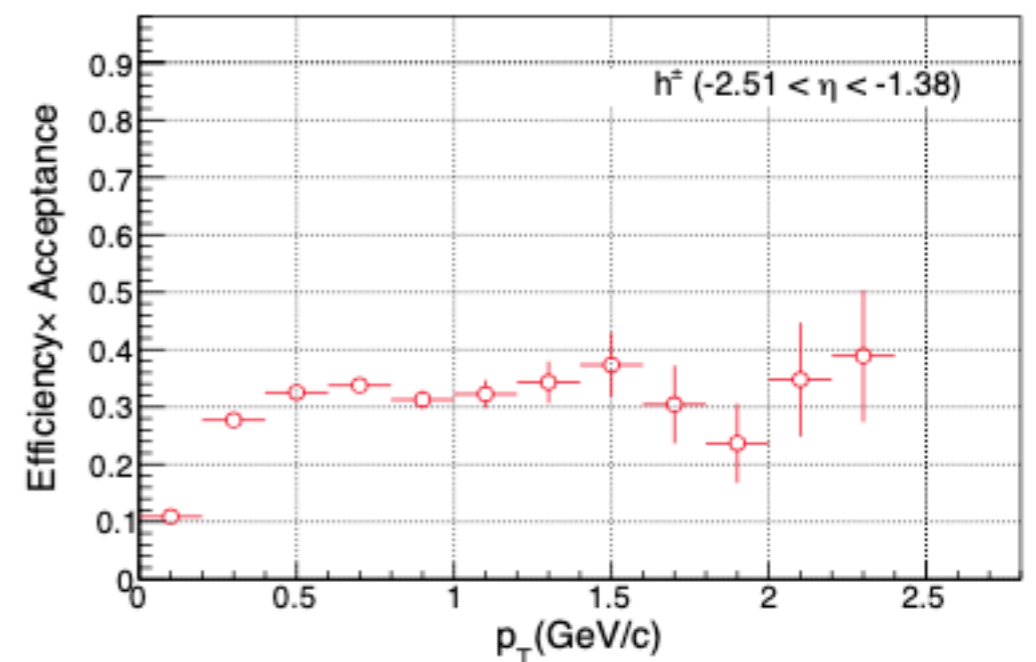
ALICE TPC tracking performances

Studies ongoing by Md Rihan Haque:

- p-Pb simulations at high event multiplicity and Time Projection Chamber (TPC) reconstruction
- 32% TPC tracking efficiency with good resolution
- Tracks lost in the most forward region: tracking algorithm to be checked
- 6% vertex efficiency: vertex finding not constrained by target position



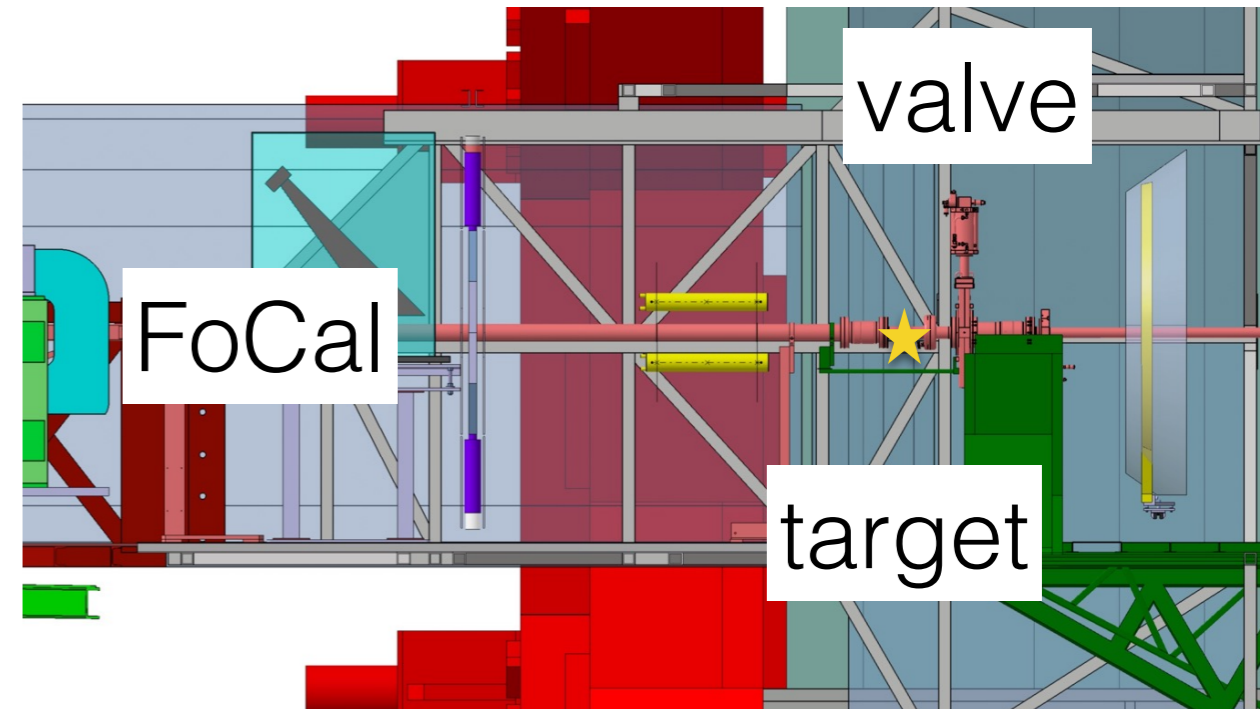
Tracking efficiency for charged particles



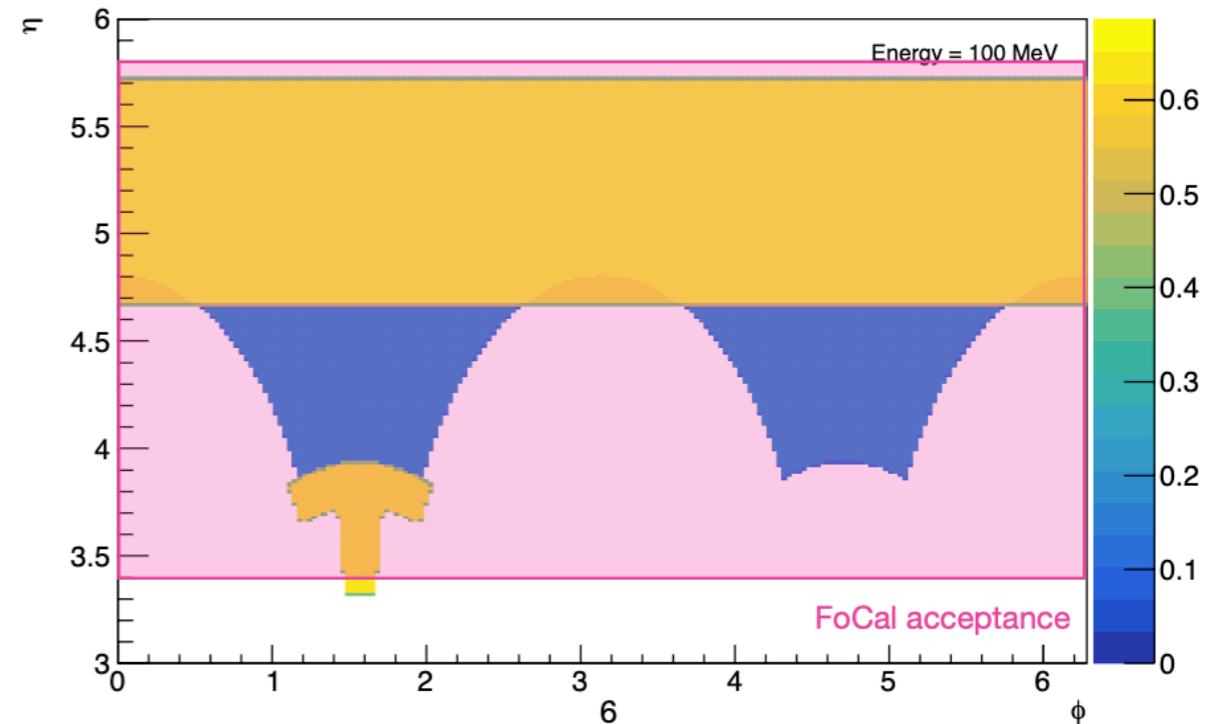
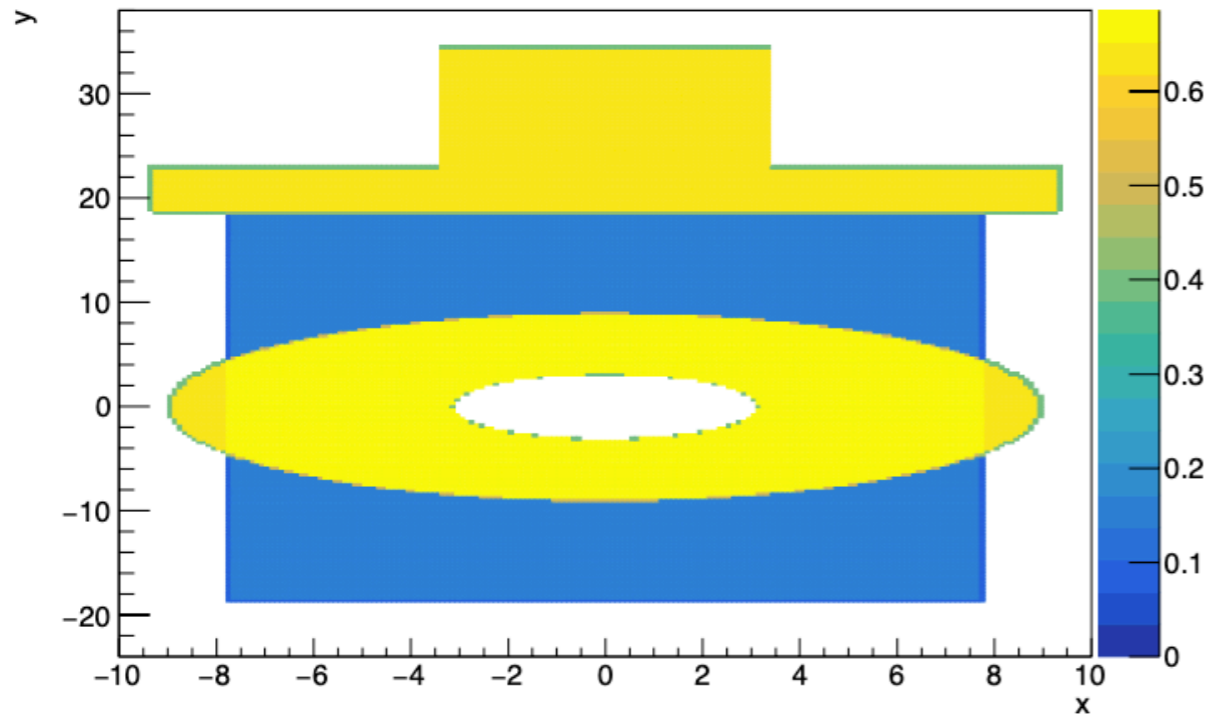
Integration studies

Studies ongoing by Charlotte Van Hulse:

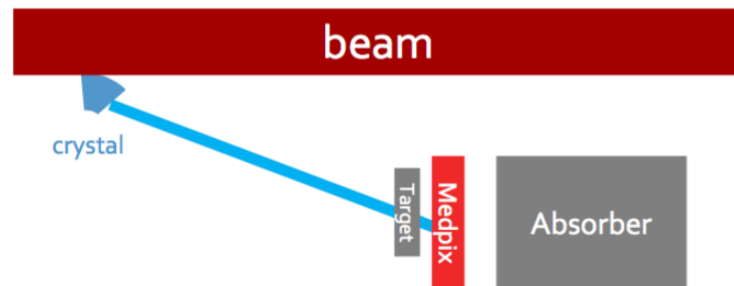
- Impact of material on FoCal detector: 1 or 2 valves and beam pipe
- 1 valve needed to isolate the target system from I.P.
- 2 valves would be better to easily remove/add the target system
- FoCal: photon detection (mainly for pPb collisions)
- Study of impact of material for photon detection with simplistic valve (drawings of the valve not complete - internal detail under industrial secret protection)
- Large interaction rate (aim at max. 0.25 interaction rate)
- Possibility to have thinner valve (in particular connecting flanges)?



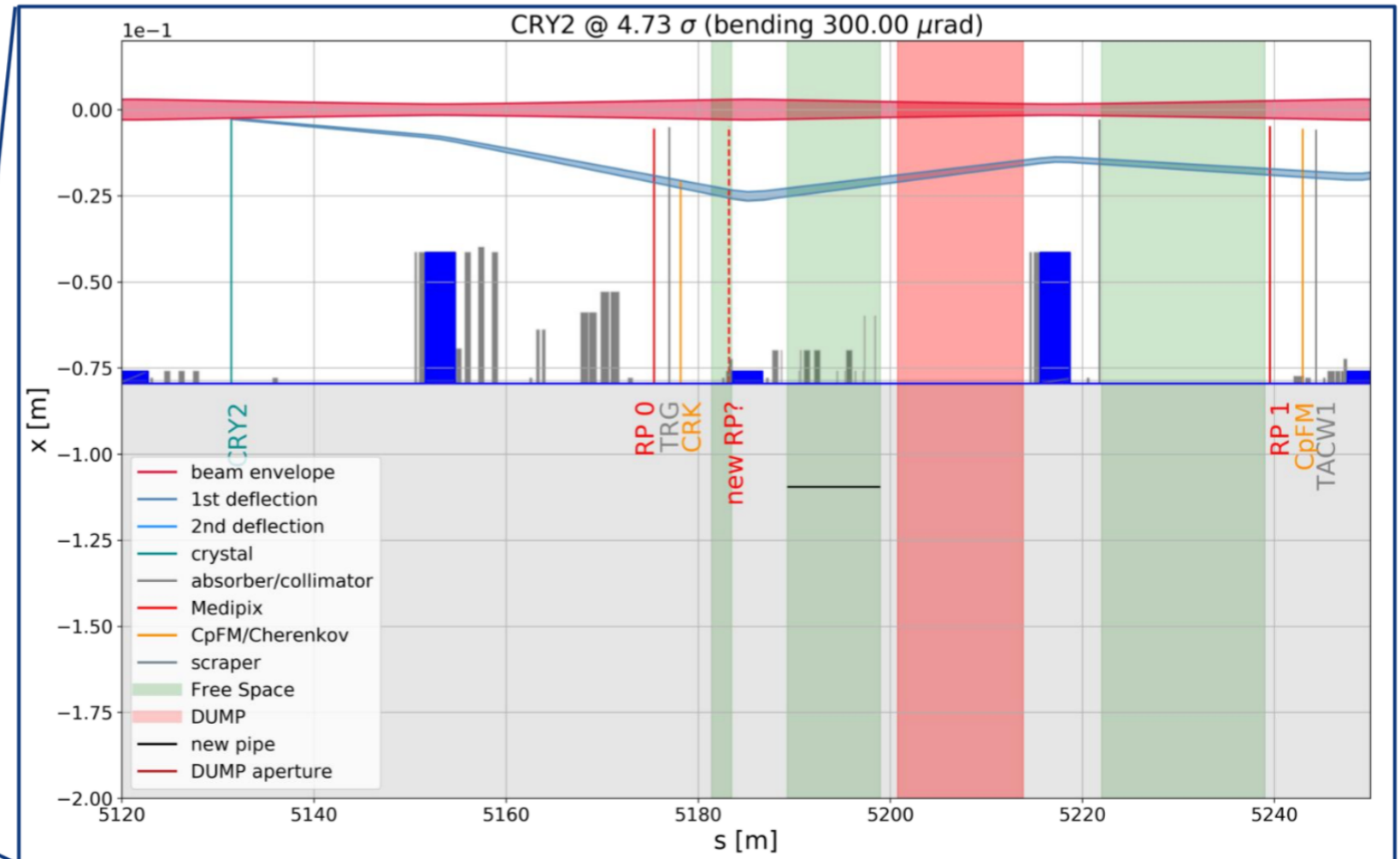
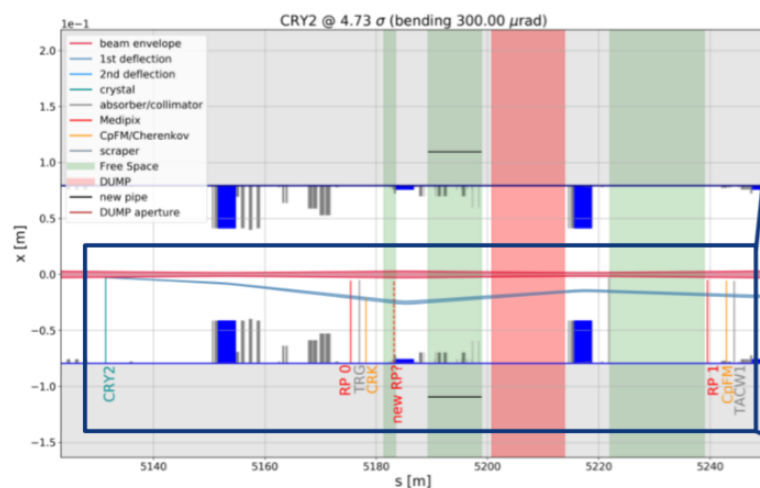
photon interaction probability (100 MeV photon)



ALICE Fixed target: SPS test beam



New RP, after TECS.51799 (CRY3/4), can be useful for the measurement



November 8th, 2019

R.Rossi - SPS Experimental Layout

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- Collaboration with UA9:
 - SPS test beam in 21/22: 2021 with a Carbon target provided by UA9
 - Test beam preparation with ALICE target setup in 2022

ALICE Fixed target plans

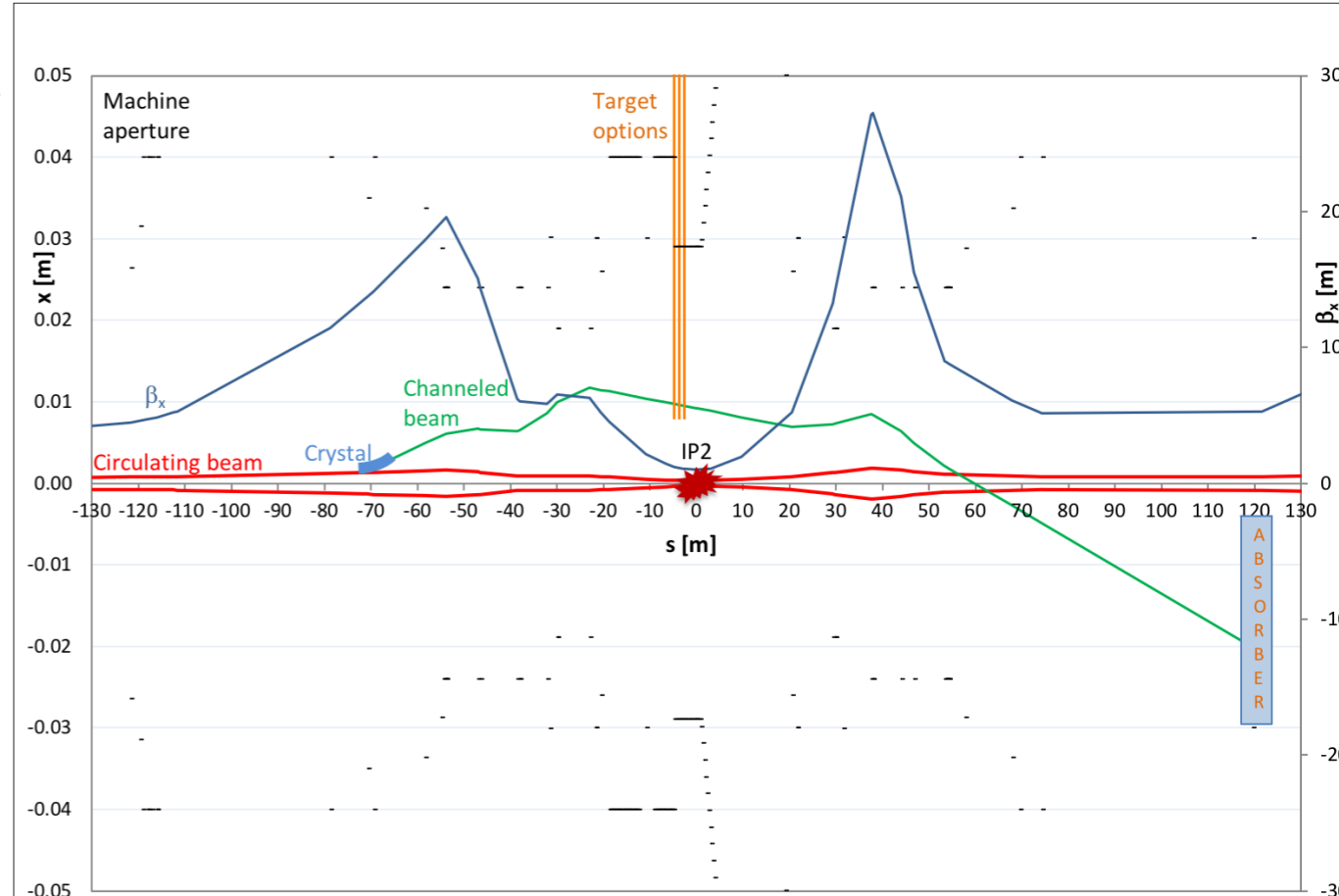
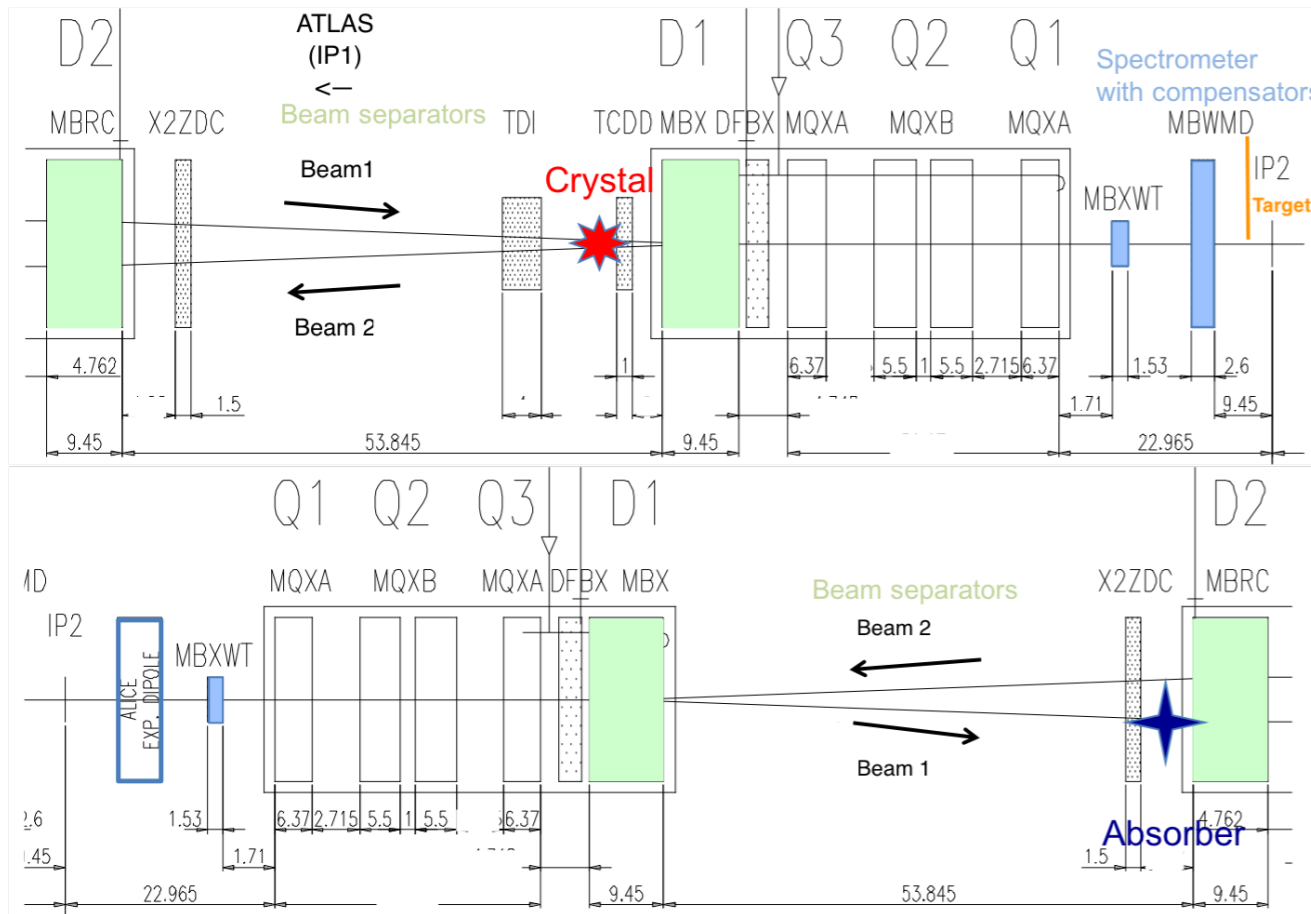
- Main physics motivations identified with proton and lead beams (ESPP document)
 - to be refined with more realistic simulations: start with proton physics
 - consolidate the physics case with central barrel
- Fixed-target implementations:
 - currently studied: beam splitting thanks to a bent crystal coupled to a solid target in ALICE, possible target location identified
- Ongoing and next steps:
 - Beam splitting at IR2, collimation and cristal impedance studies (UA9+LHC collimation team)
 - Target system optimisation (IJCLab team)
 - Impedance and vacuum studies in ALICE cavern (ALICE-FT+LHC experts)
 - Simulation of TPC performances with displaced vertices (Warsaw team ongoing)
 - Target integration according to FoCal detector studies (IJCLab team ongoing)
 - SPS test beam preparation (UA9/ALICE-FT)
 - target system
 - simulations

backup

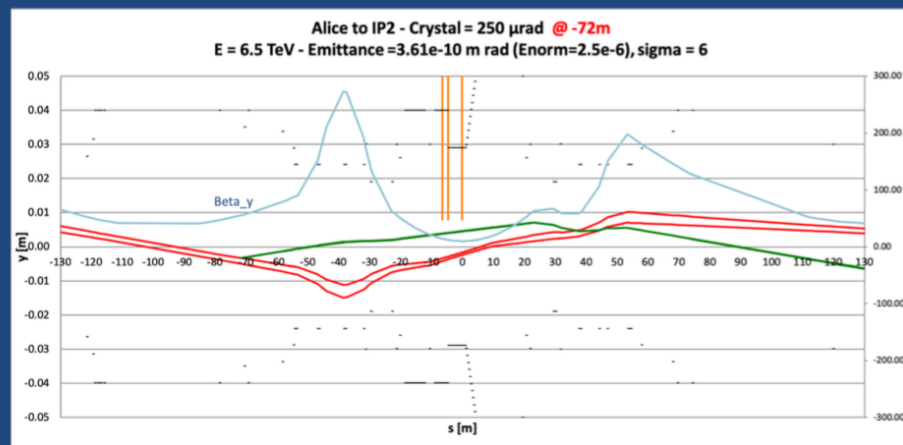
ALICE Fixed target status

- Fixed-target implementations:
 - beam splitting thanks to a bent crystal coupled to a solid target in ALICE, possible target location identified
 - possibility to use a gas target also considered (Warsaw group)

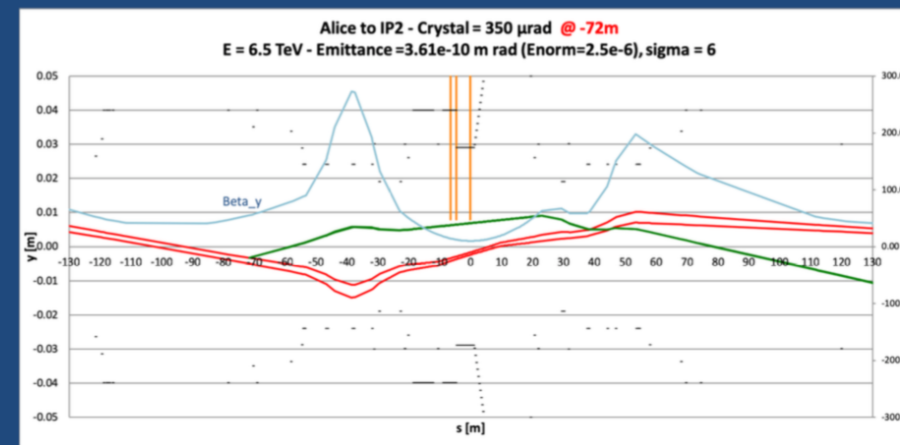
F. Galluccio and W. Scandale



- Conceptual scenario of bent crystal
 - Bending angle 250 urad
 - Horizontal beam splitting
 - Target at 8 mm from beam axis

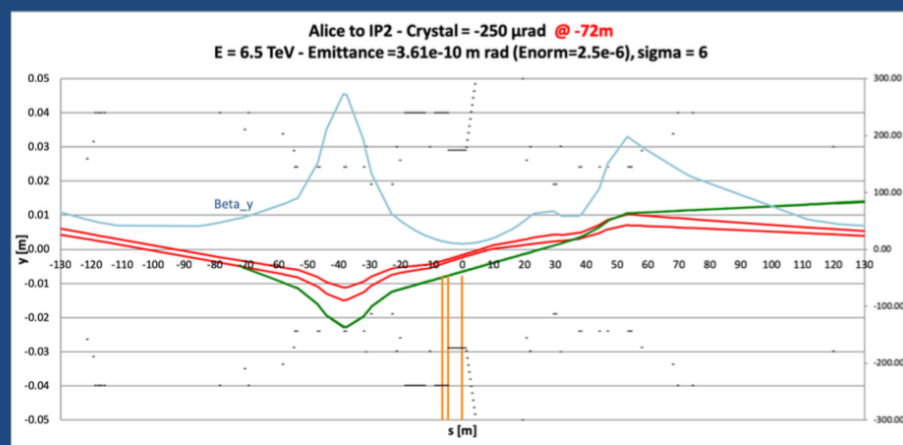


$\theta = 250 \mu\text{rad}$ - Target not reached

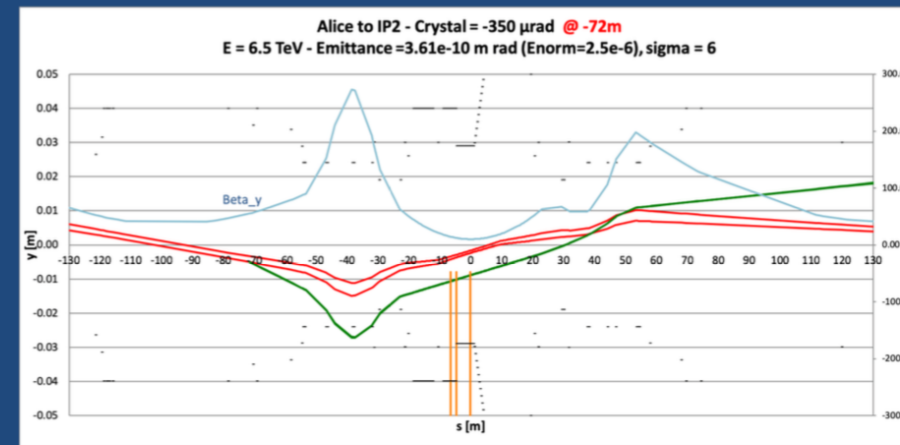


$\theta = 350 \mu\text{rad}$ - Target not reached

Target @ 8 mm



$\theta = -250 \mu\text{rad}$ - Target not reached



$\theta = -350 \mu\text{rad}$ - Aperture too small

- Layout optimization:
 - Acceptable distance of target from circulating beam (4 mm in IR3 studies)
 - Acceptable crystal angle
 - Vertical plane might become accessible to avoid asynchronous dump risk
 - Full local collimation system might be needed
 - Availability of beam line slots to be checked: preliminary integration study
- Simulation studies needed such as for IR8 and IR3