Impact studies of fixed-target system on FoCal in ALICE

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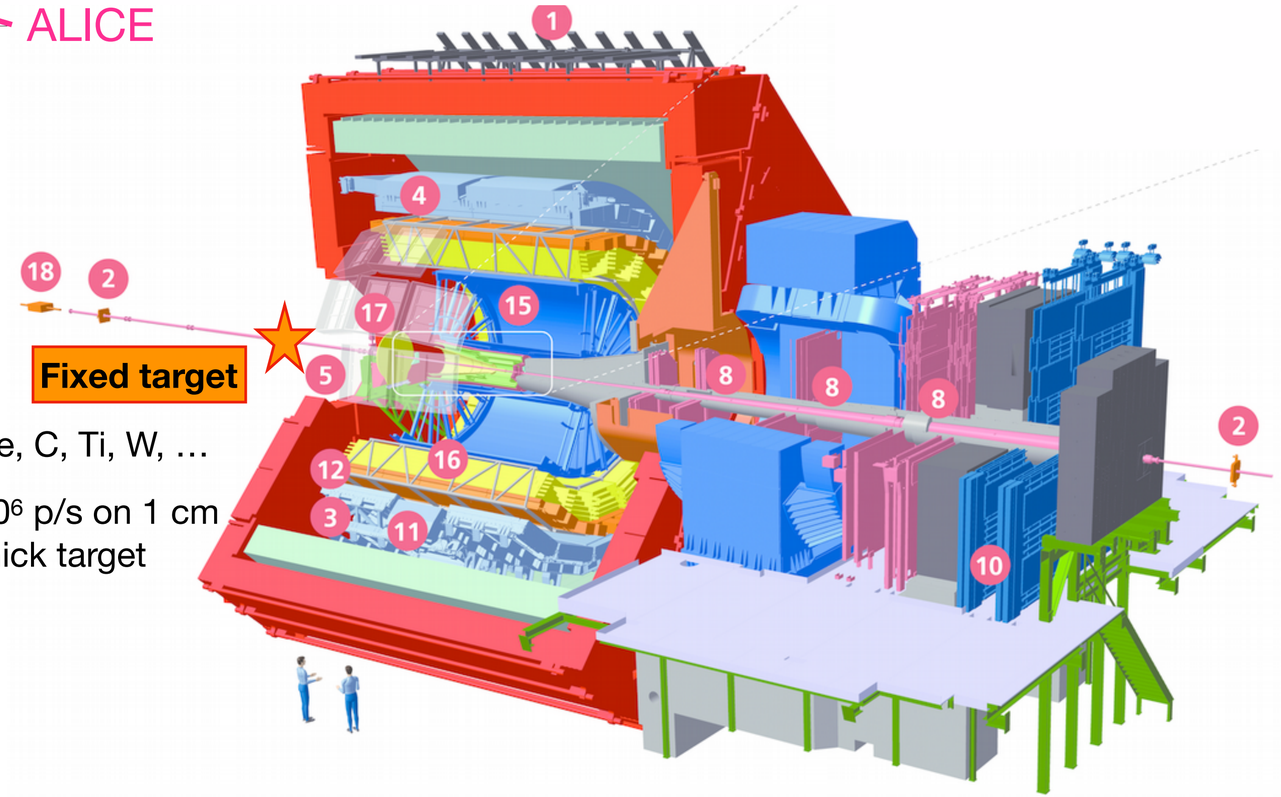
Joint workshop "GDR-QCD/QCD@short distances and STRONG2020/PARTONS/FTE@LHCE/NLOACCESS"
31 May — 4 June 2021

Fixed target at ALICE

ALICE

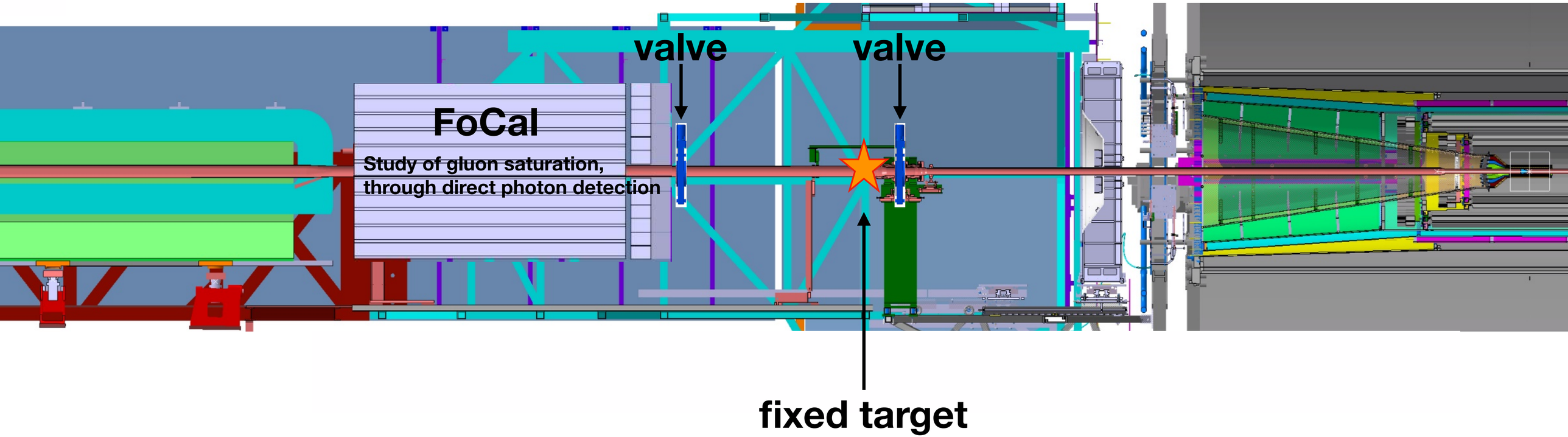


If approved, target installation during LHC LS3 (2025-2027)

Be, C, Ti, W, …

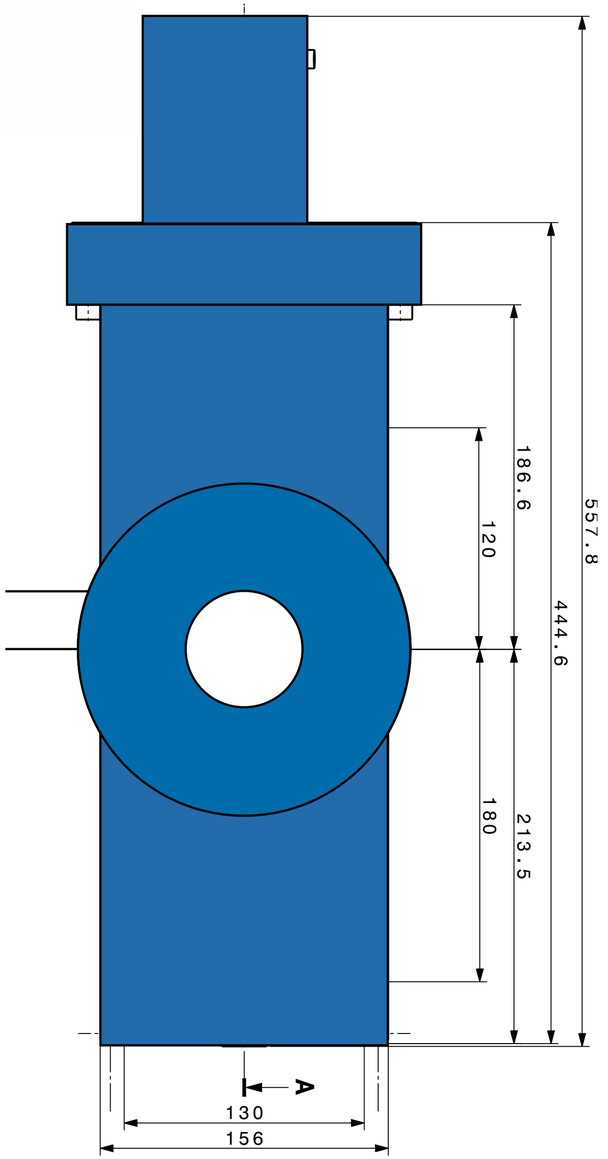
10^6 p/s on 1 cm thick target

Fixed target and FoCal: original concept



Impact of valves on FoCal: original concept

Main material valve=stainless steel



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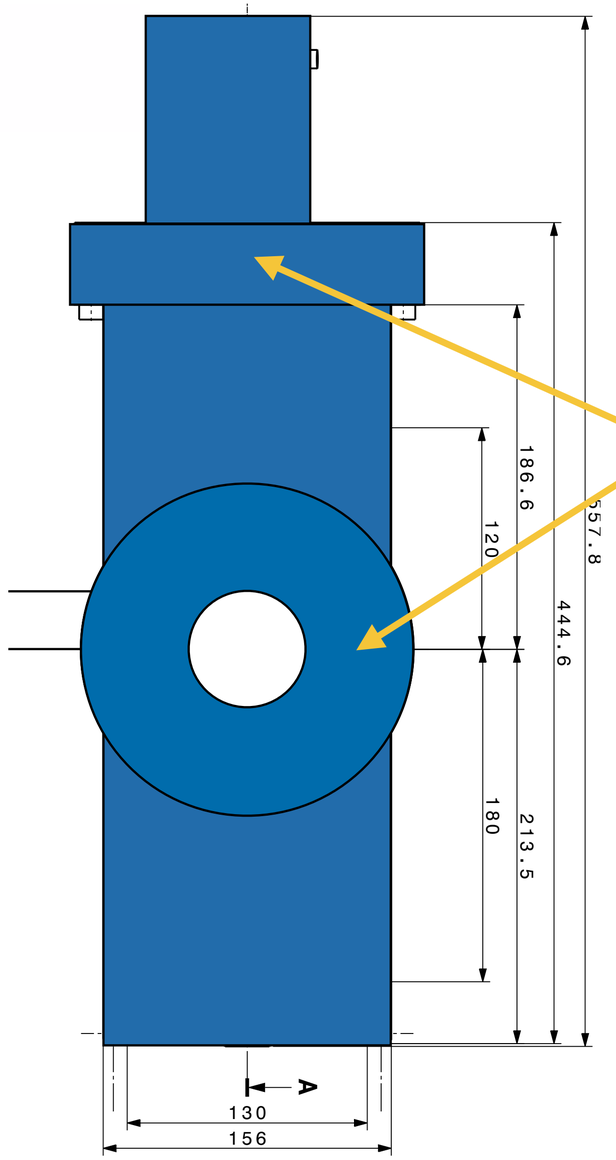
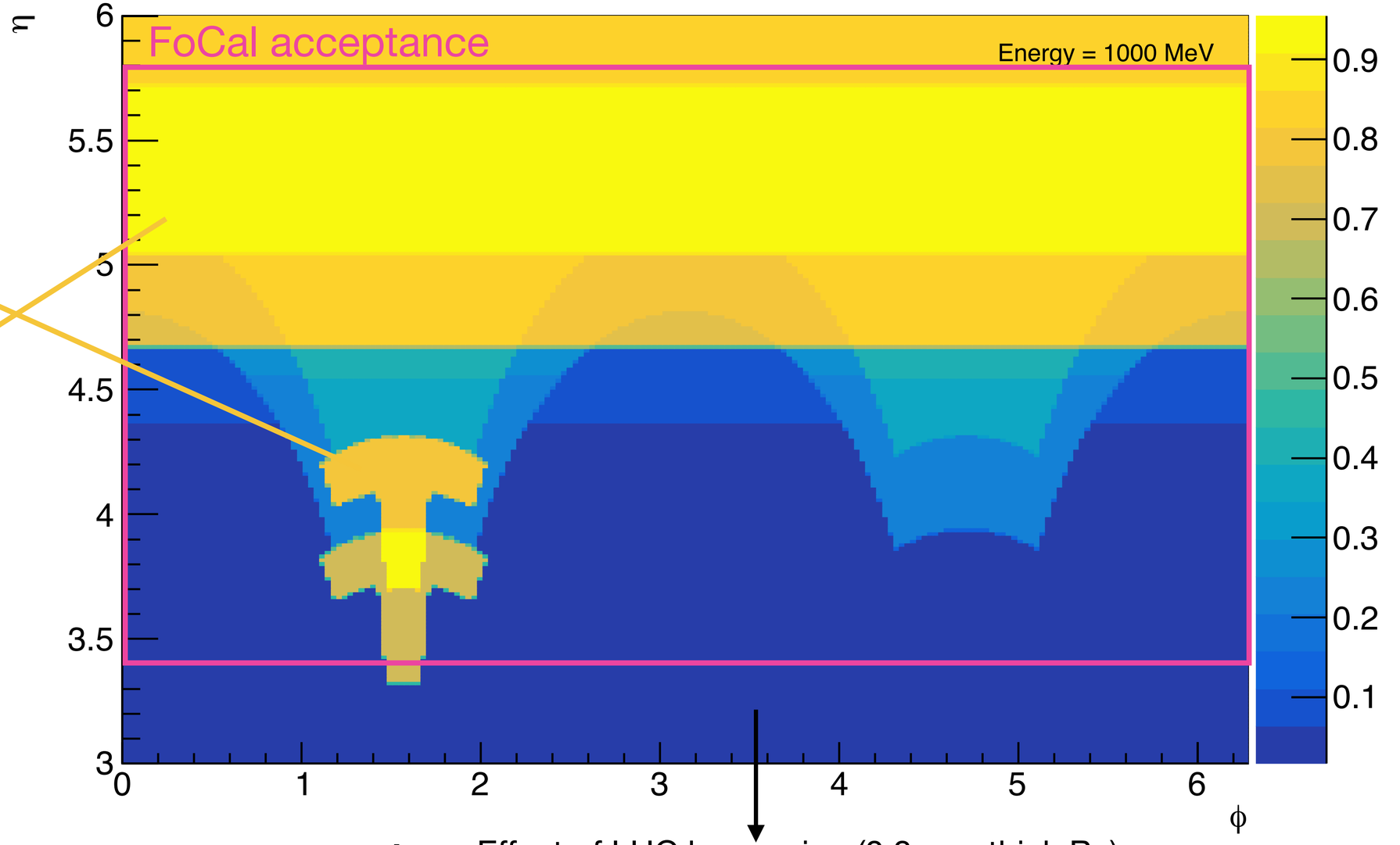
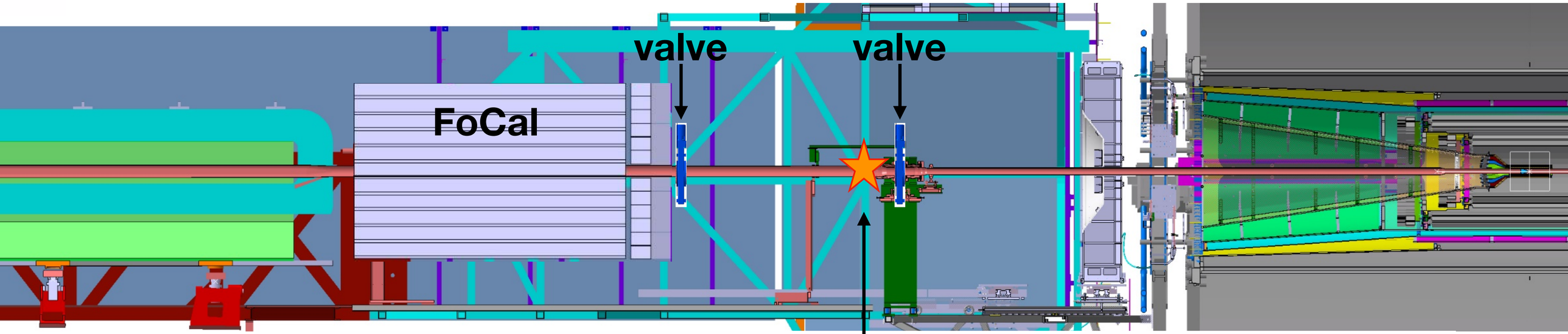


Photon interaction probability



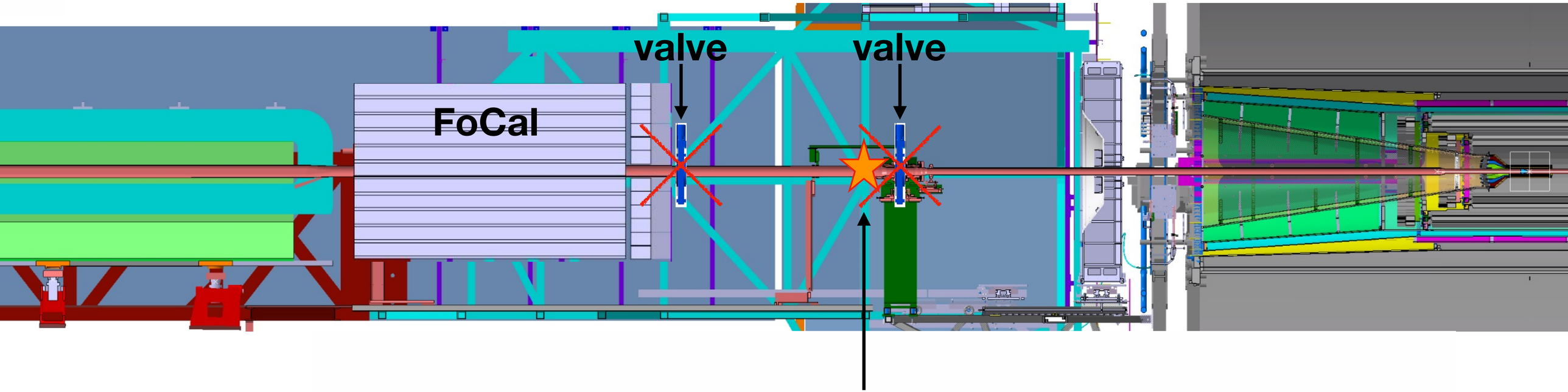
Effect of LHC beam pipe (0.8 mm thick Be)

Fixed target and FoCal: new concept



at z=470 cm from IP

Fixed target and FoCal: new concept



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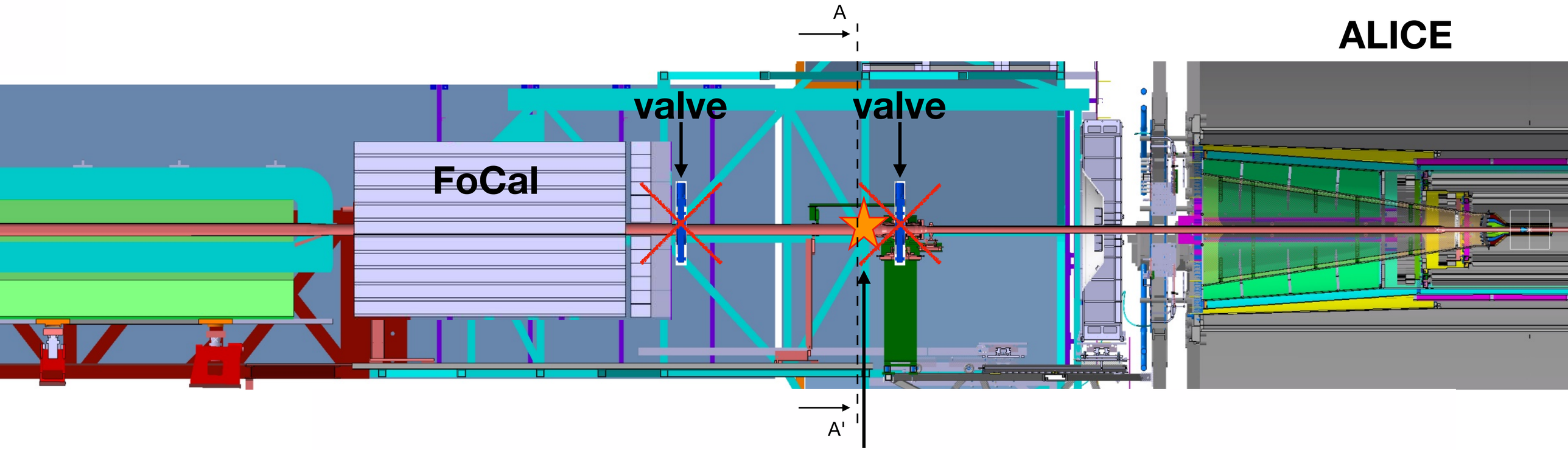
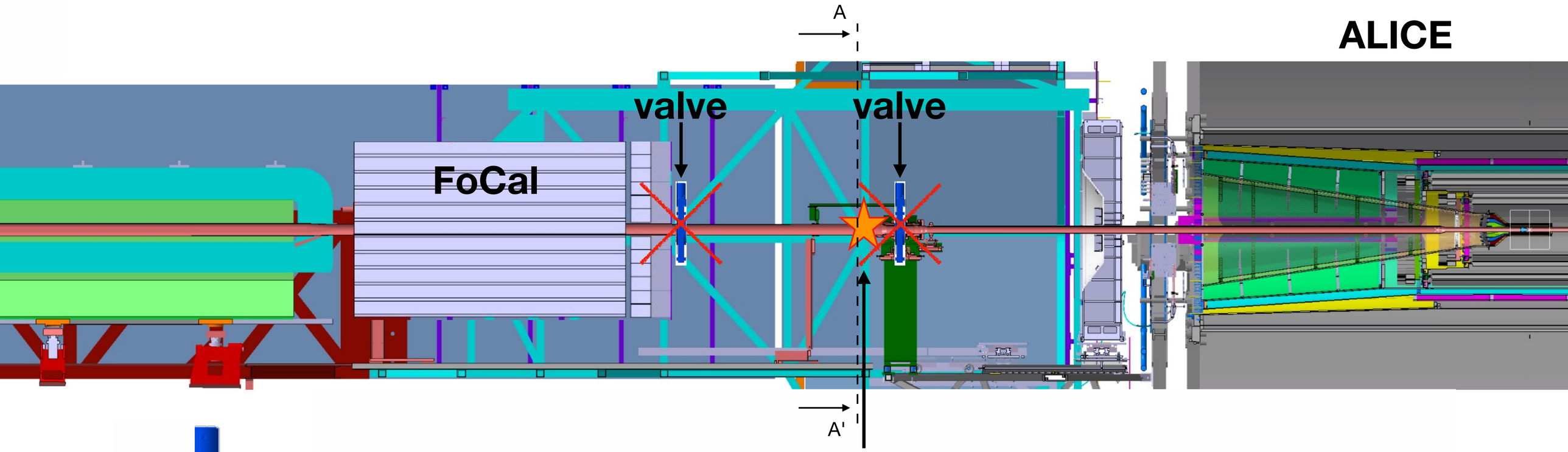
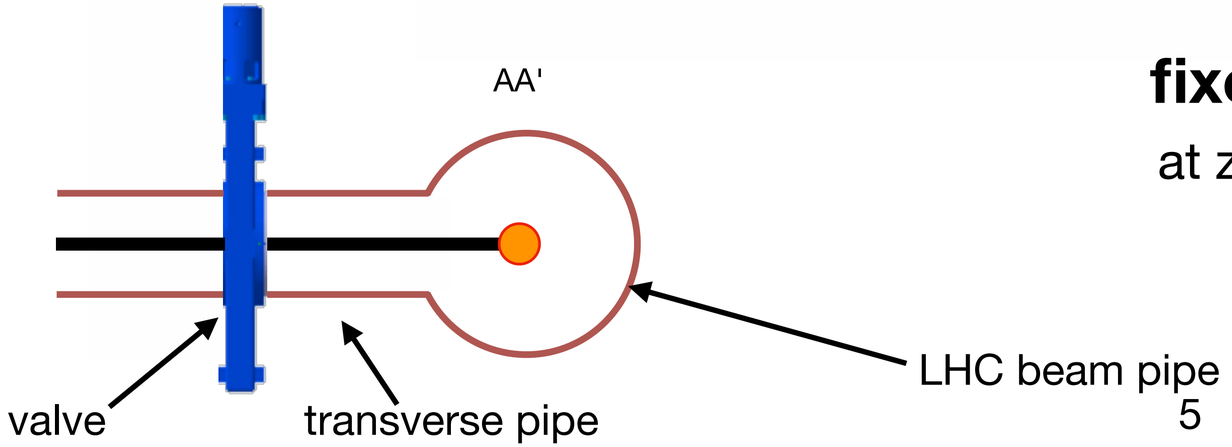


fixed target

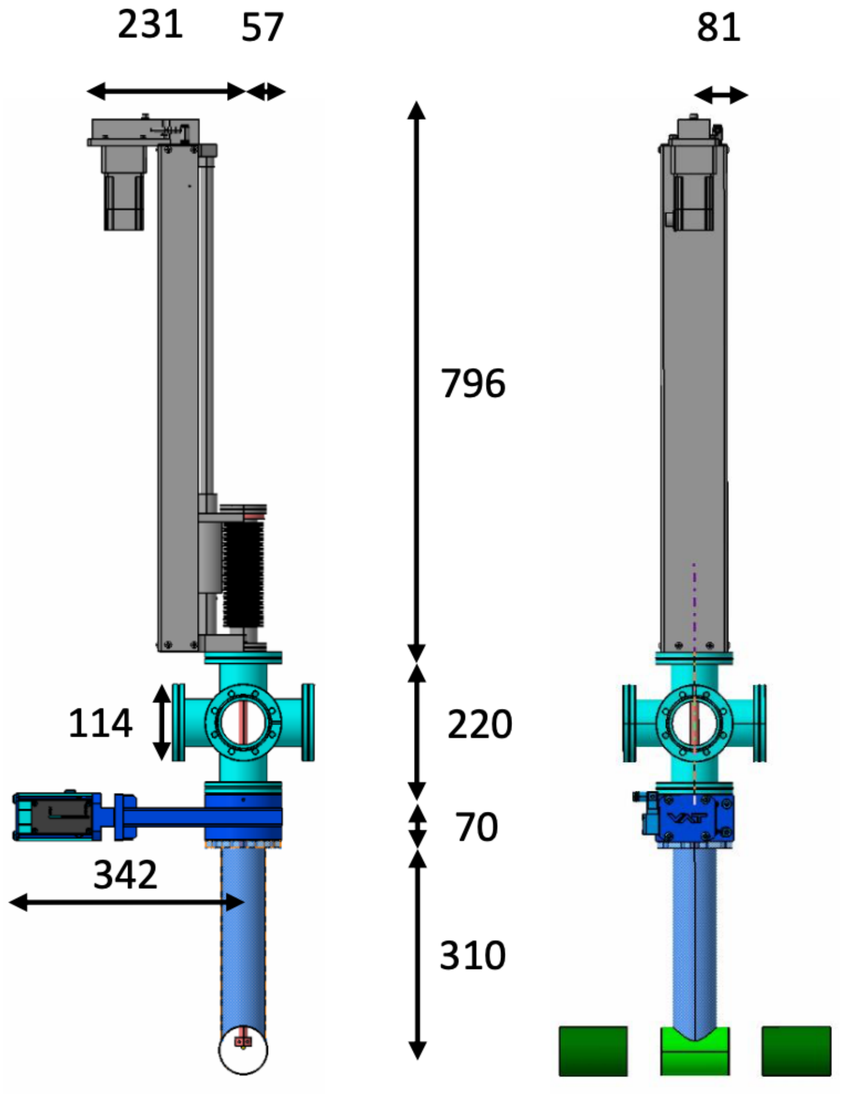
at z=470 cm from IP

Fixed target and FoCal: new concept





Current conceptual design (in development)



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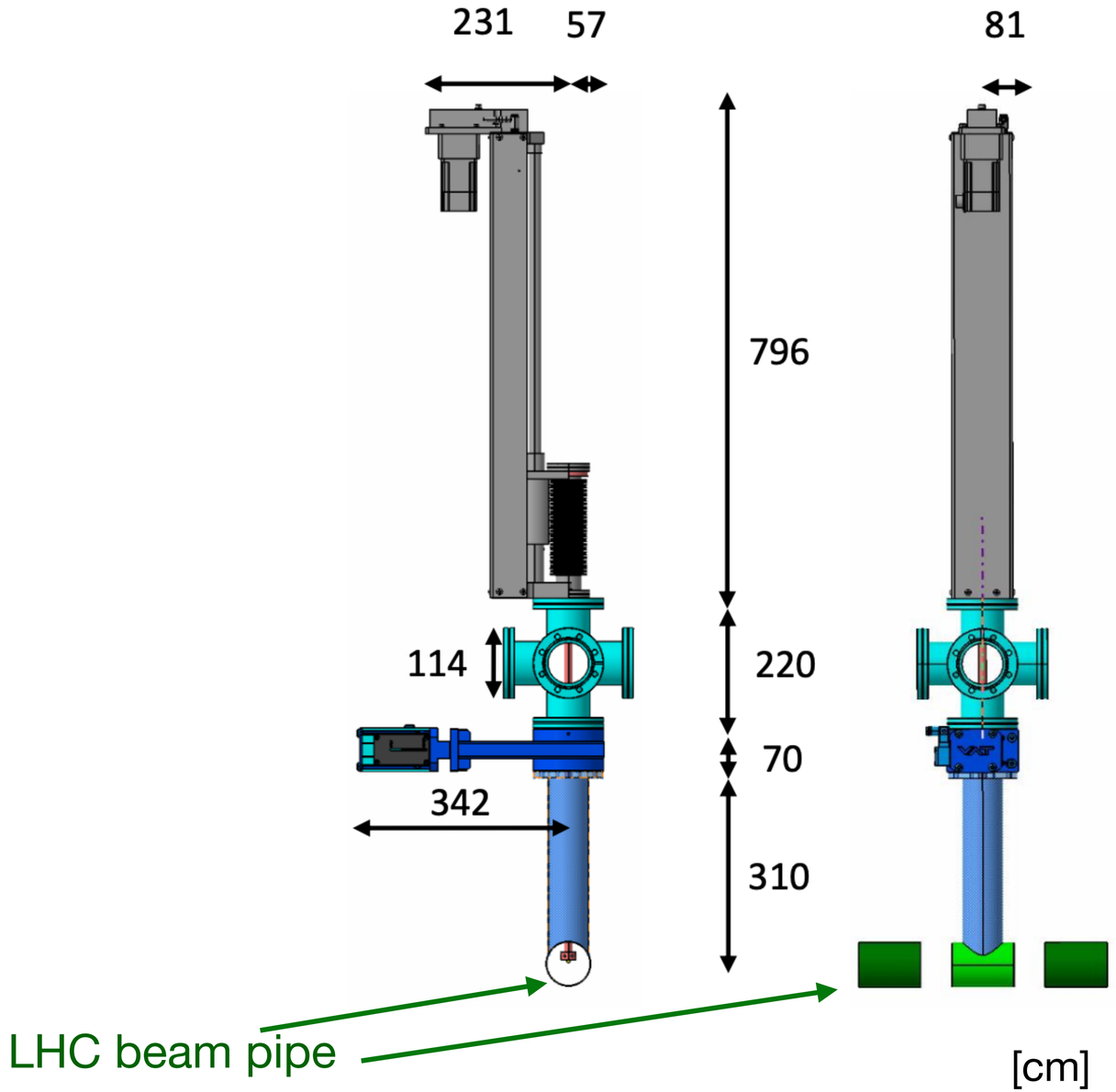

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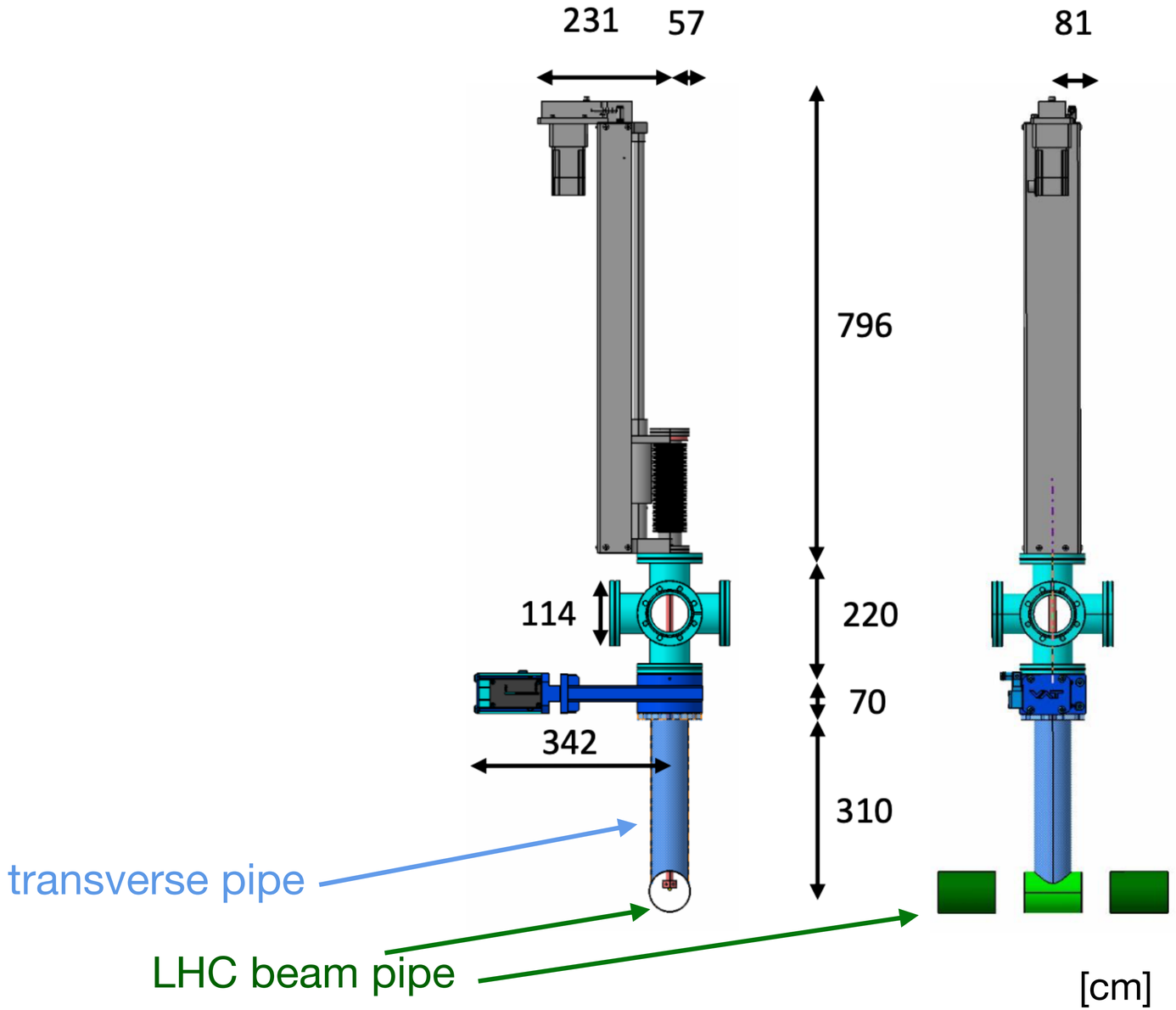

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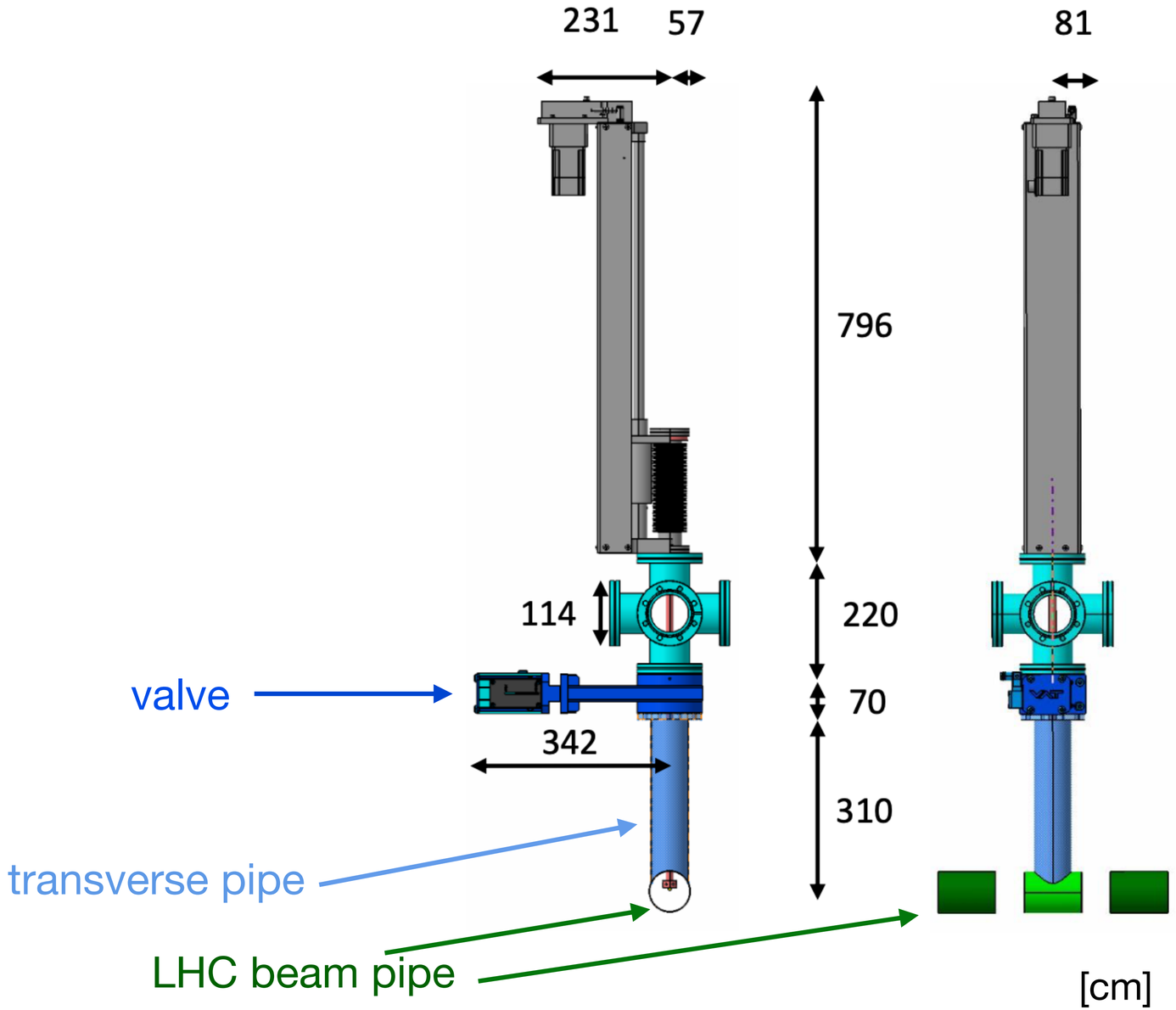

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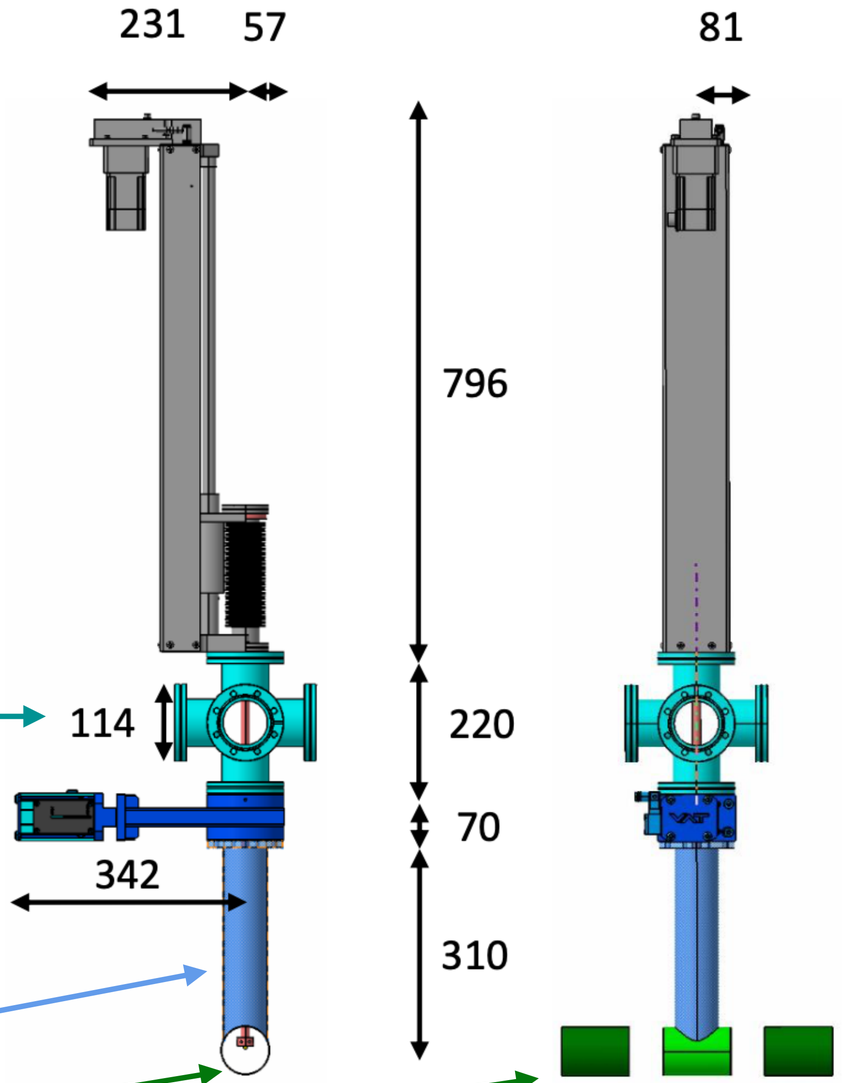

cross (to hold vacuum pump, ion pump, vacuum gauge)

valve

transverse pipe

LHC beam pipe

[cm]

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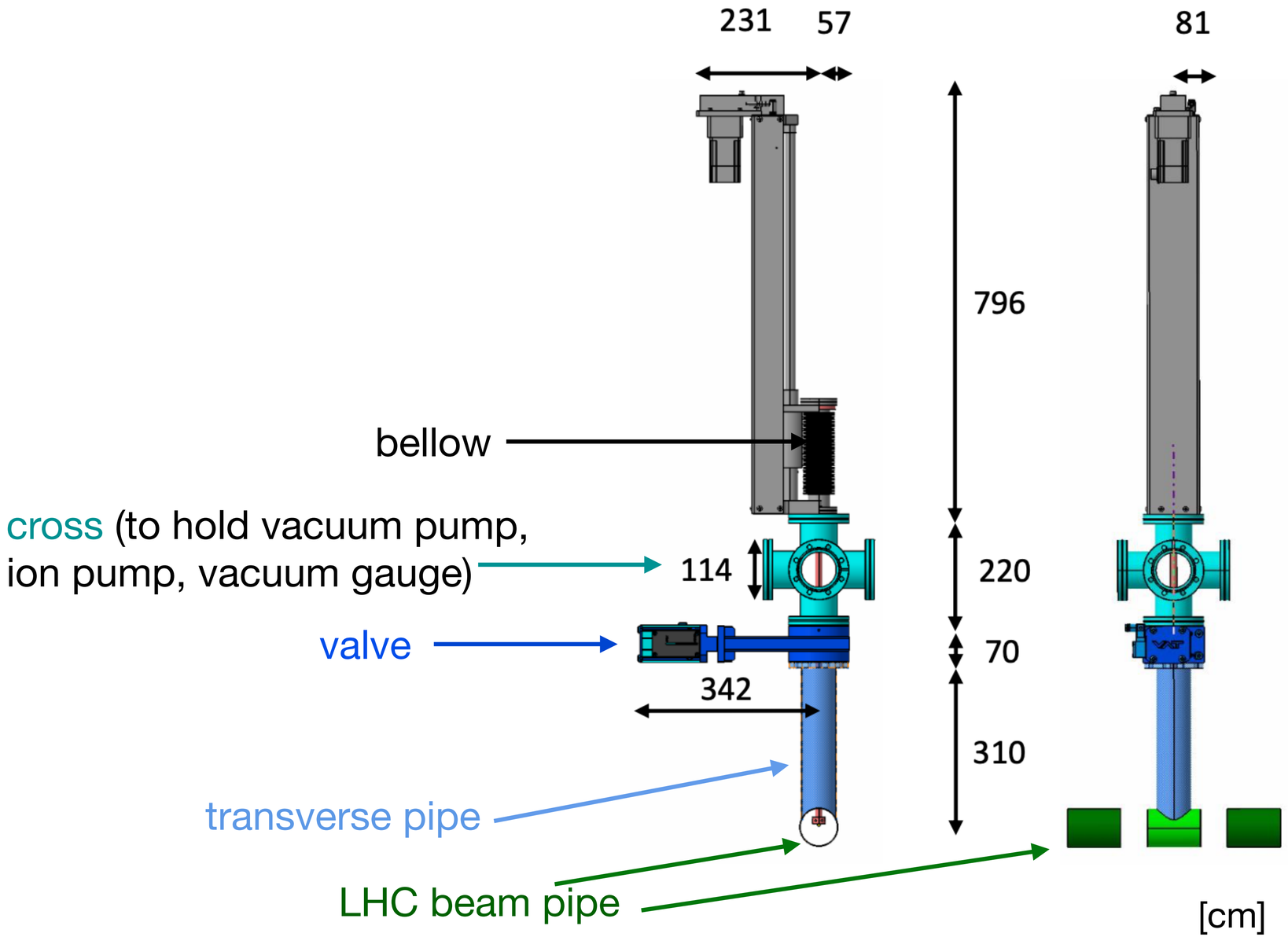

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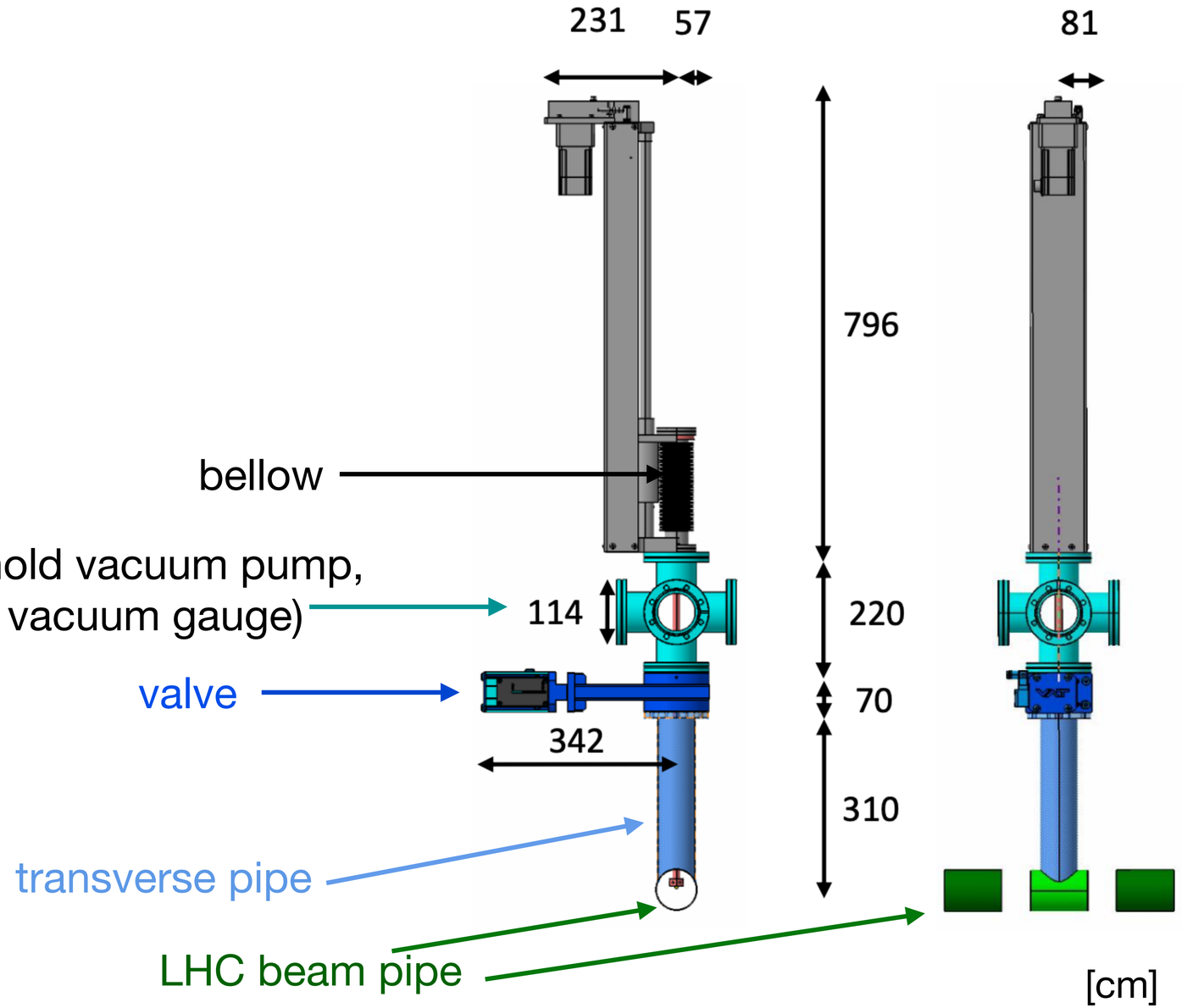
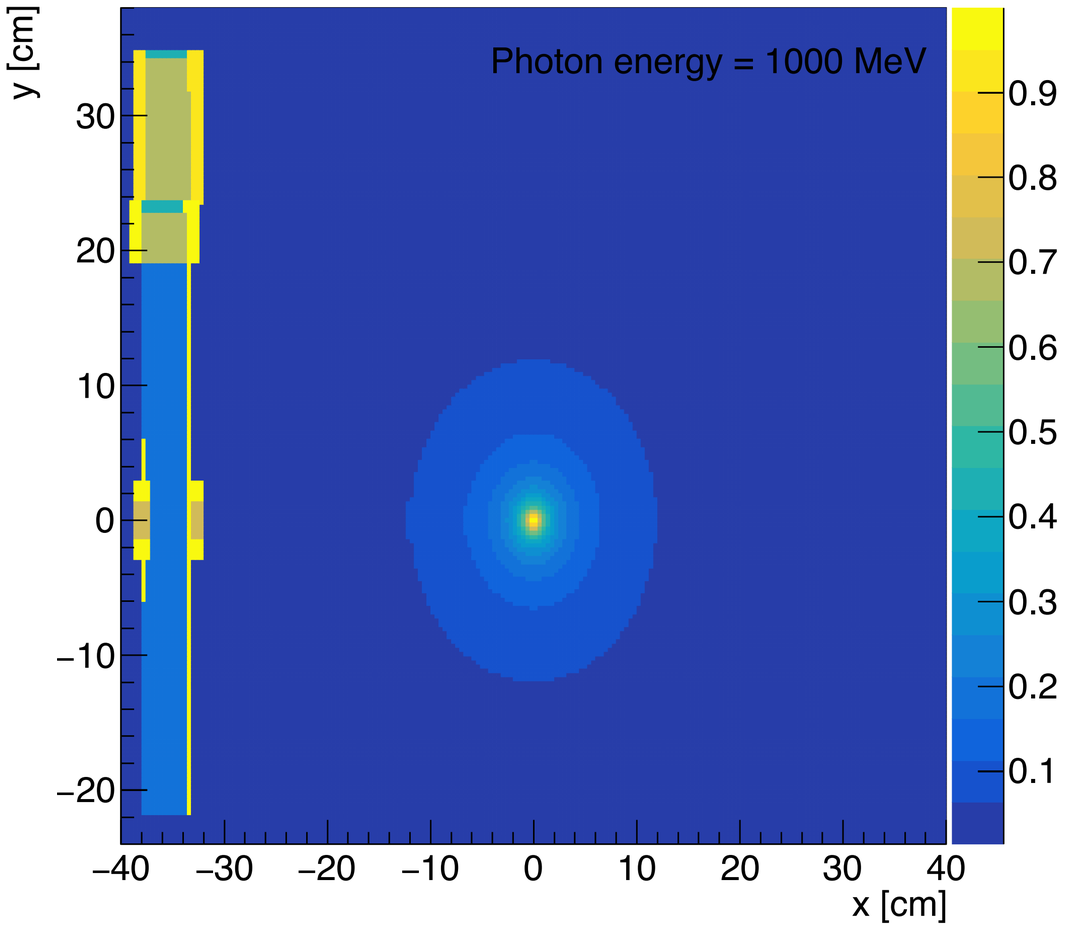


Cf. presentation
Kevin Pressard
02/06 afternoon

Impact of valve and transverse pipe on FoCal

LHC beam pipe and transverse pipe=0.8 mm thick Be

Photon interaction probability



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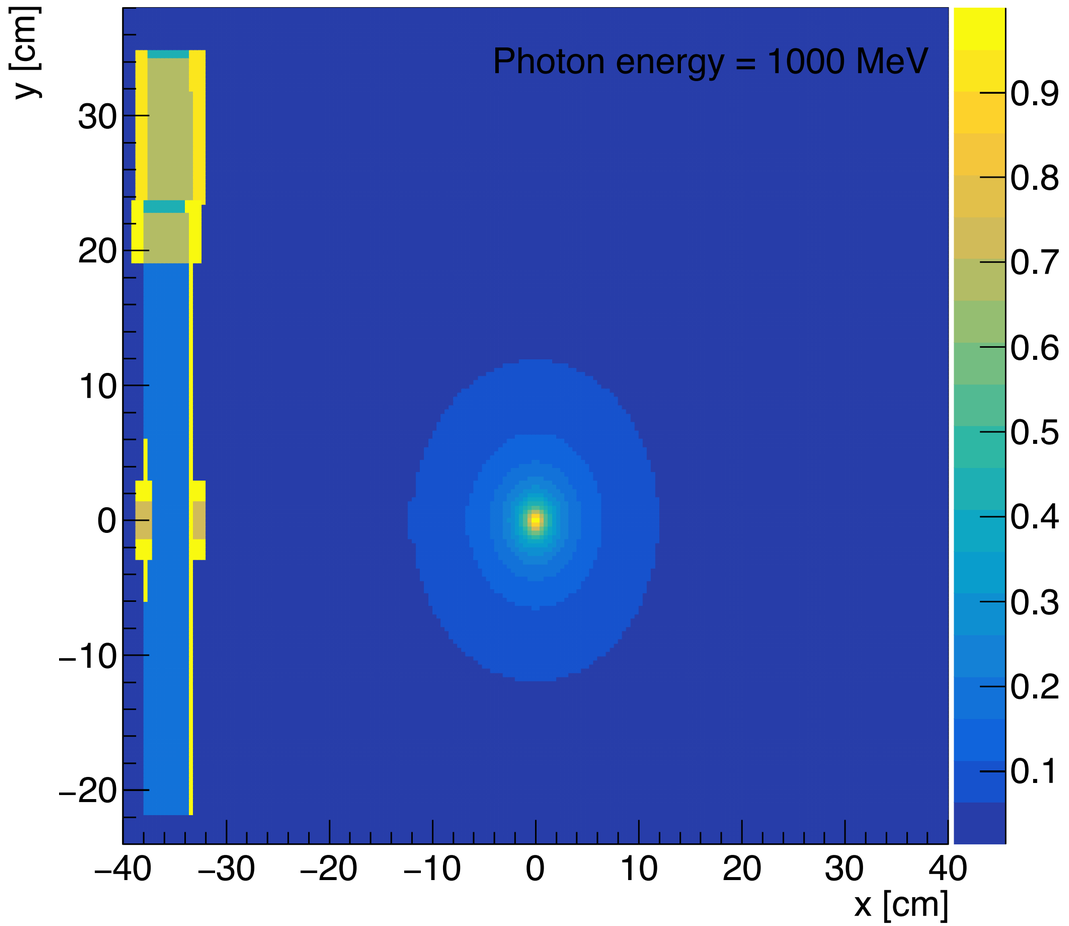

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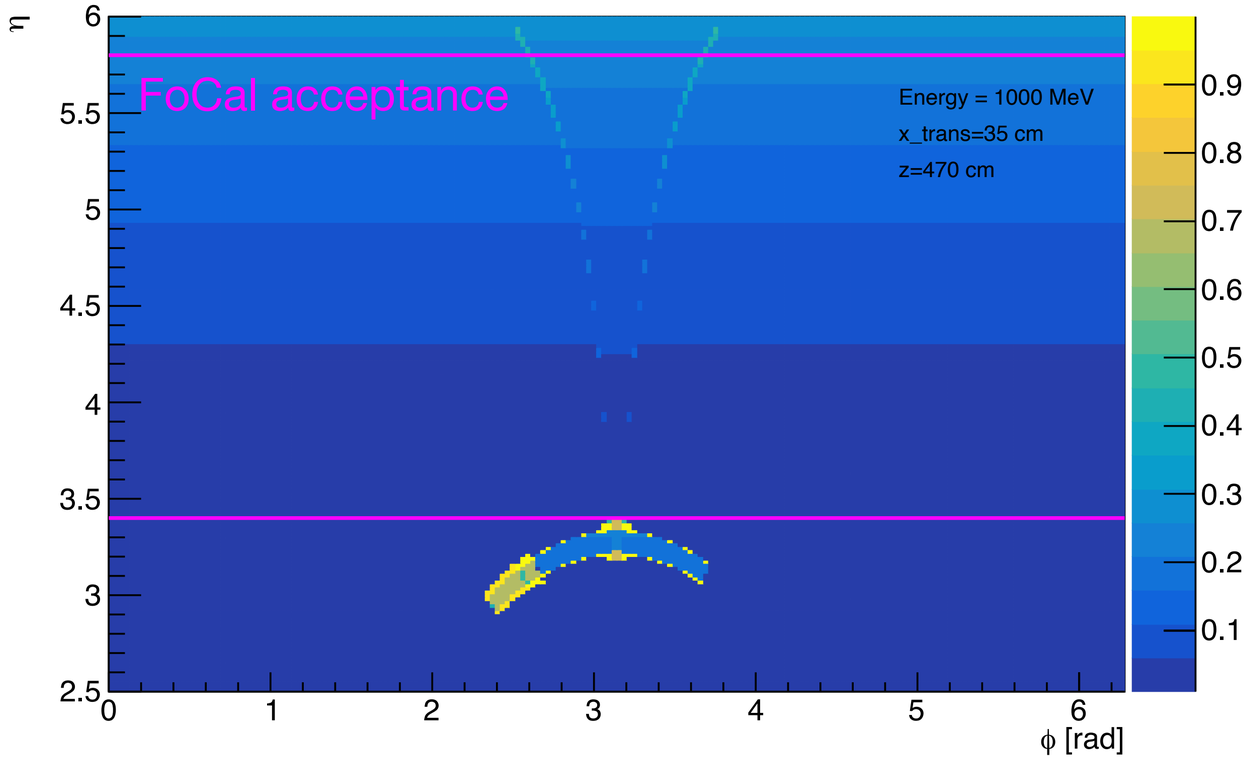

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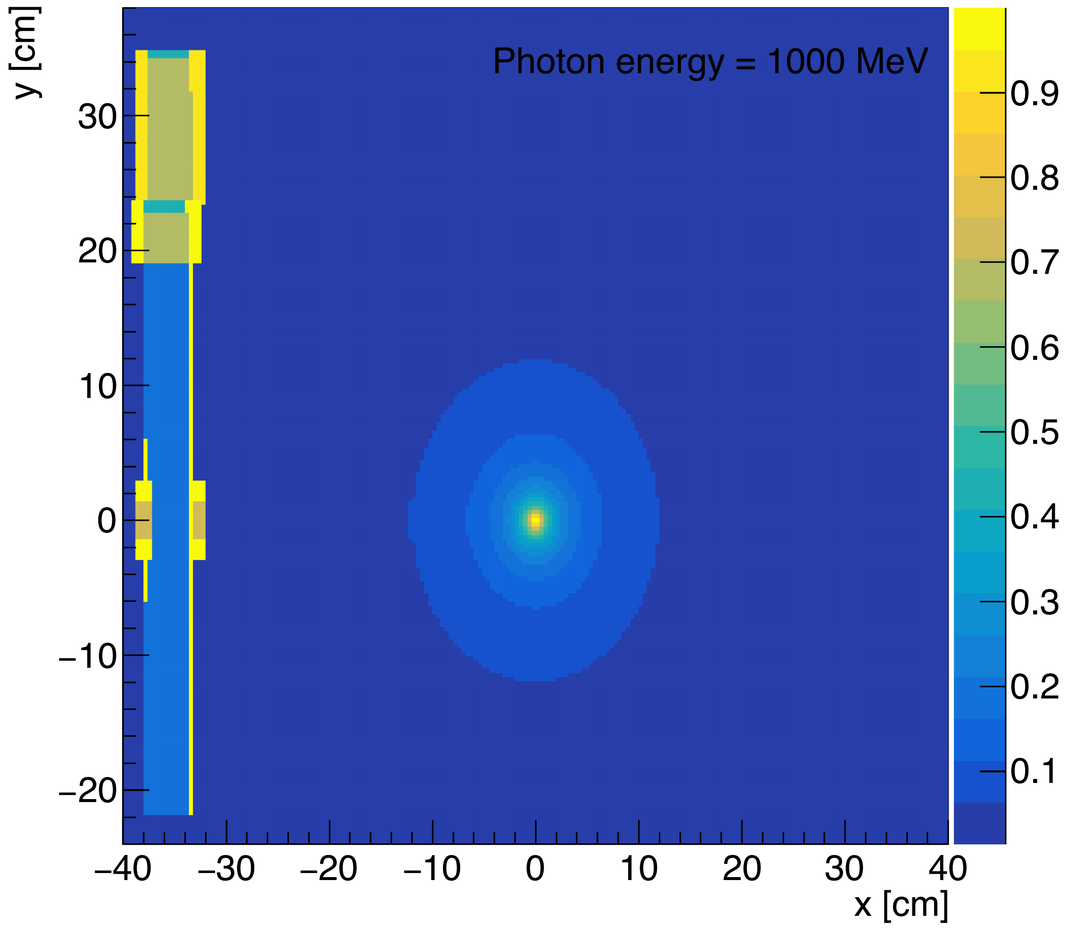

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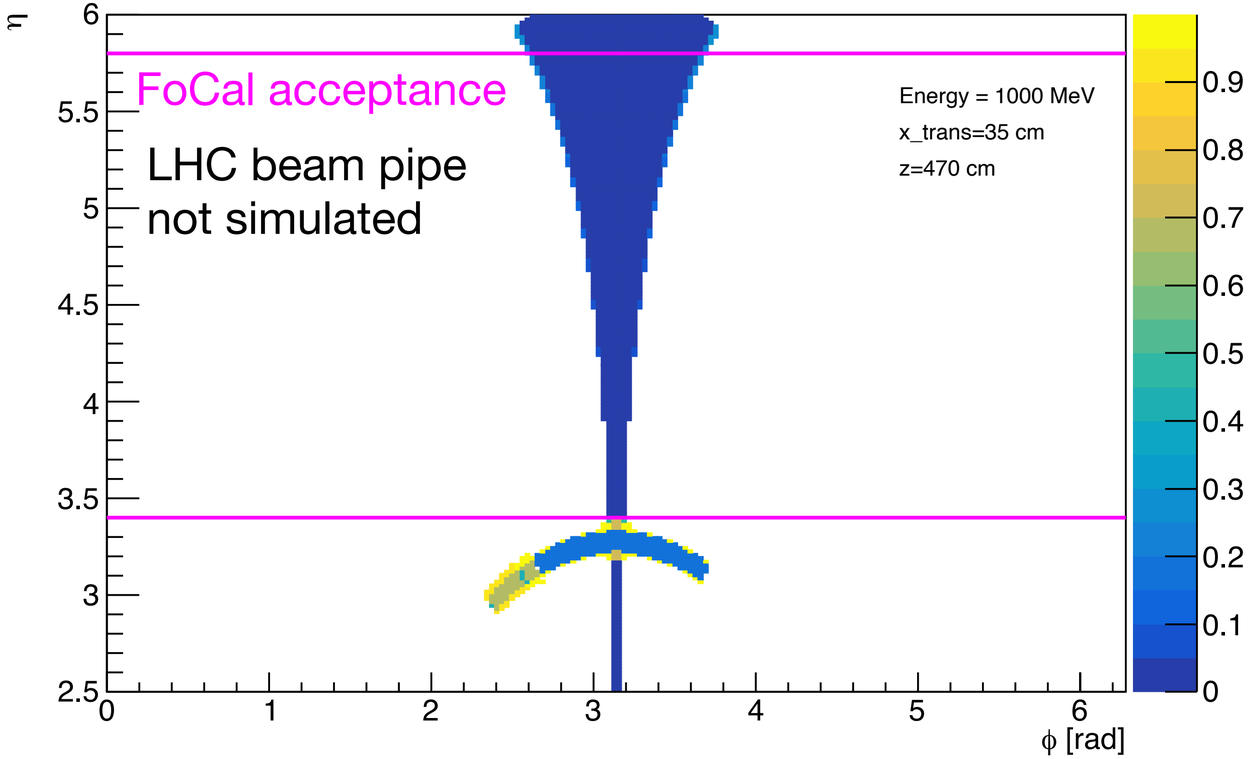

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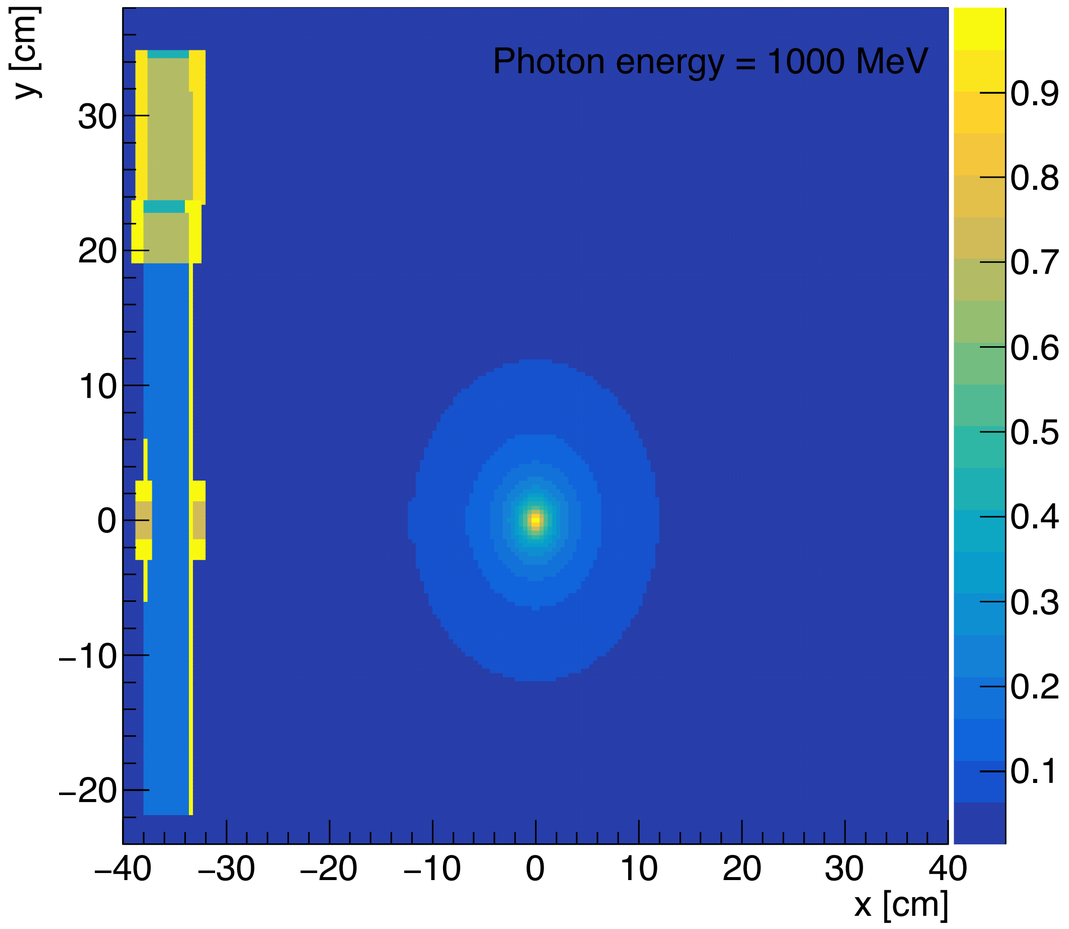

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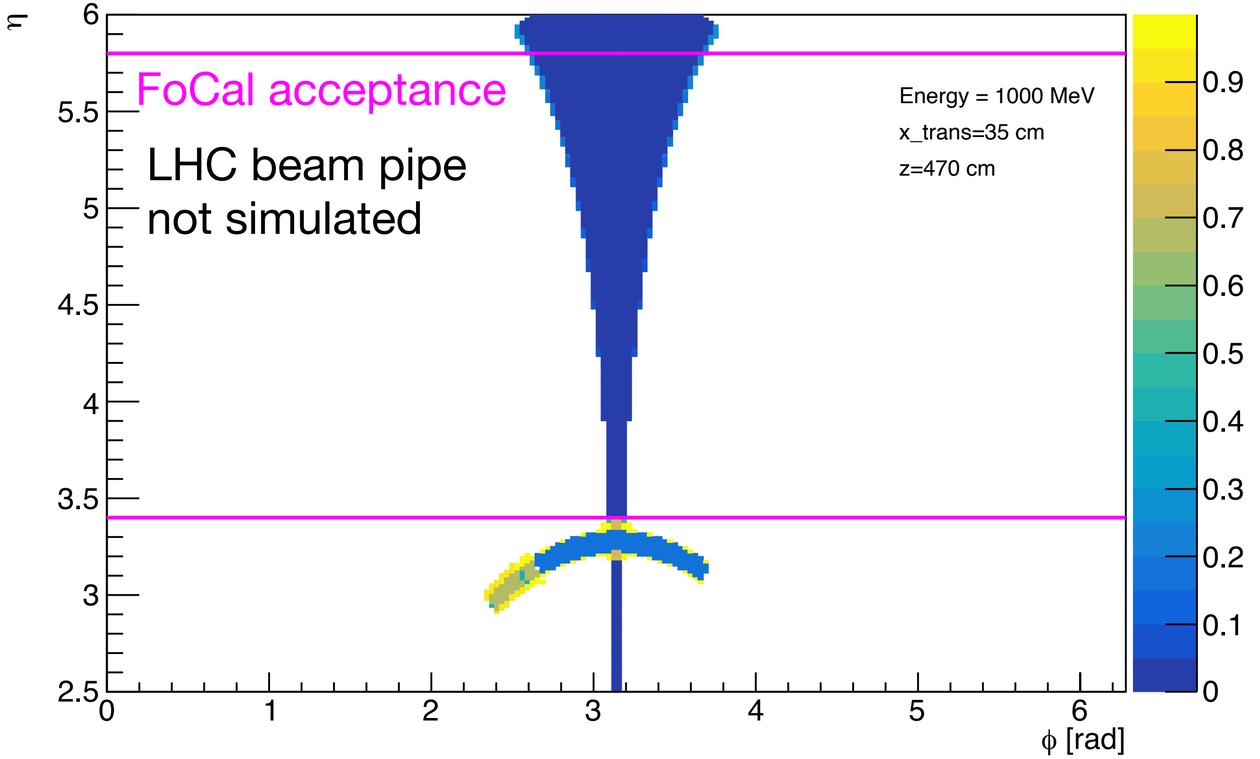
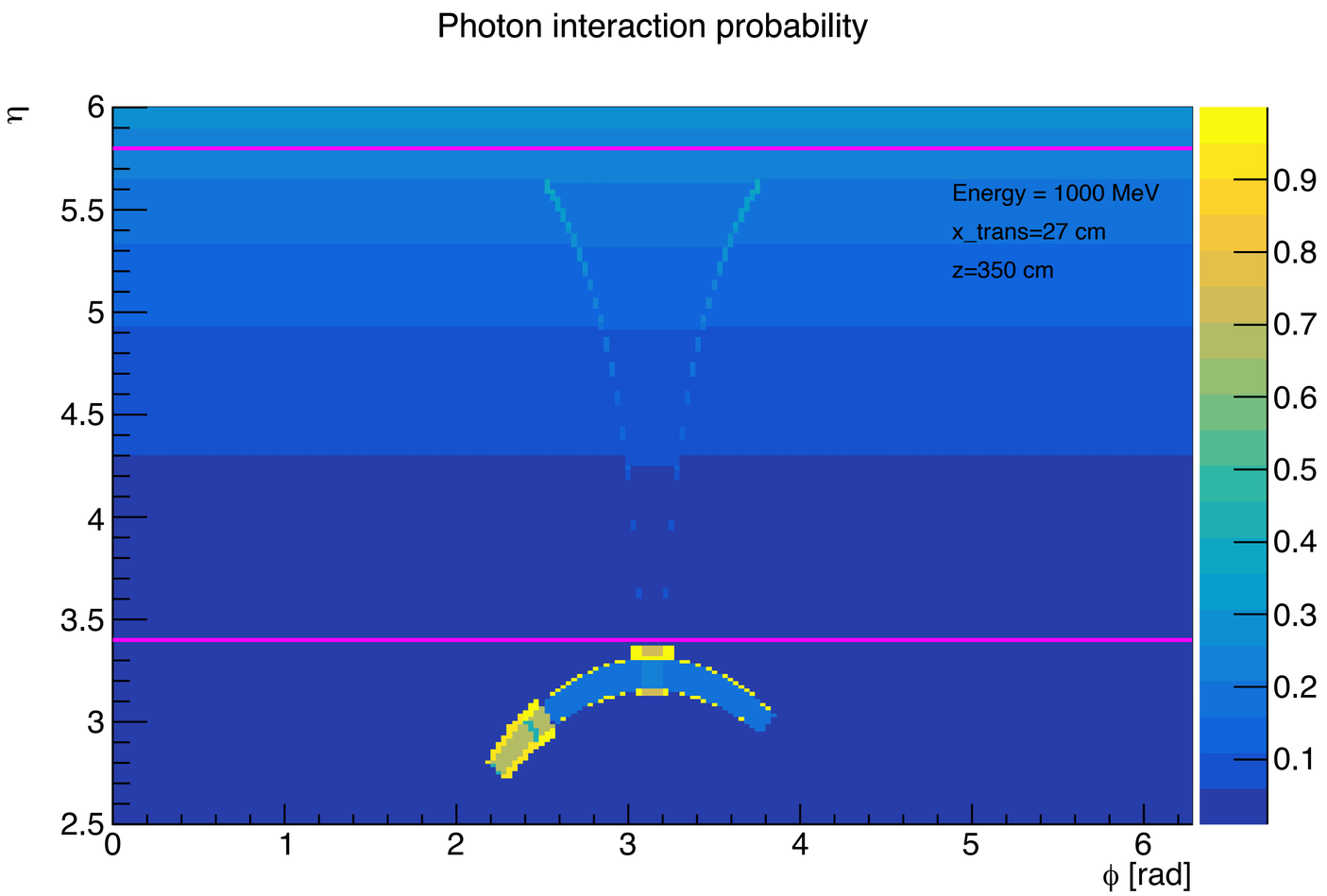


Strongly reduced impact of target structure on FOCAL

Alternative position of system



z=350 cm from IP

- slightly shorter transverse pipe and below
- more backward in rapidity
- close to FIT, possibility needs to be further investigated

Summary and outlook

- Side-ways positioning of target-system: limited impact on FOCAL.
- Target-system implemented in ALICE framework and impact studies are ongoing.
- Target-system design
    - Size and positioning: compromise between impact on FOCAL, space constraints and closeness to IP.
    - Material-budget: impact on FOCAL, holding structure, stability of target positioning
    - Very strong vacuum constraints! (10^{-11} mbar)
    - Impedance: rod acting as antena.