

# A fixed target for ALICE

Charlotte Van Hulse



This project has received funding from the European Union's Horizon 2020 research and innovation programme

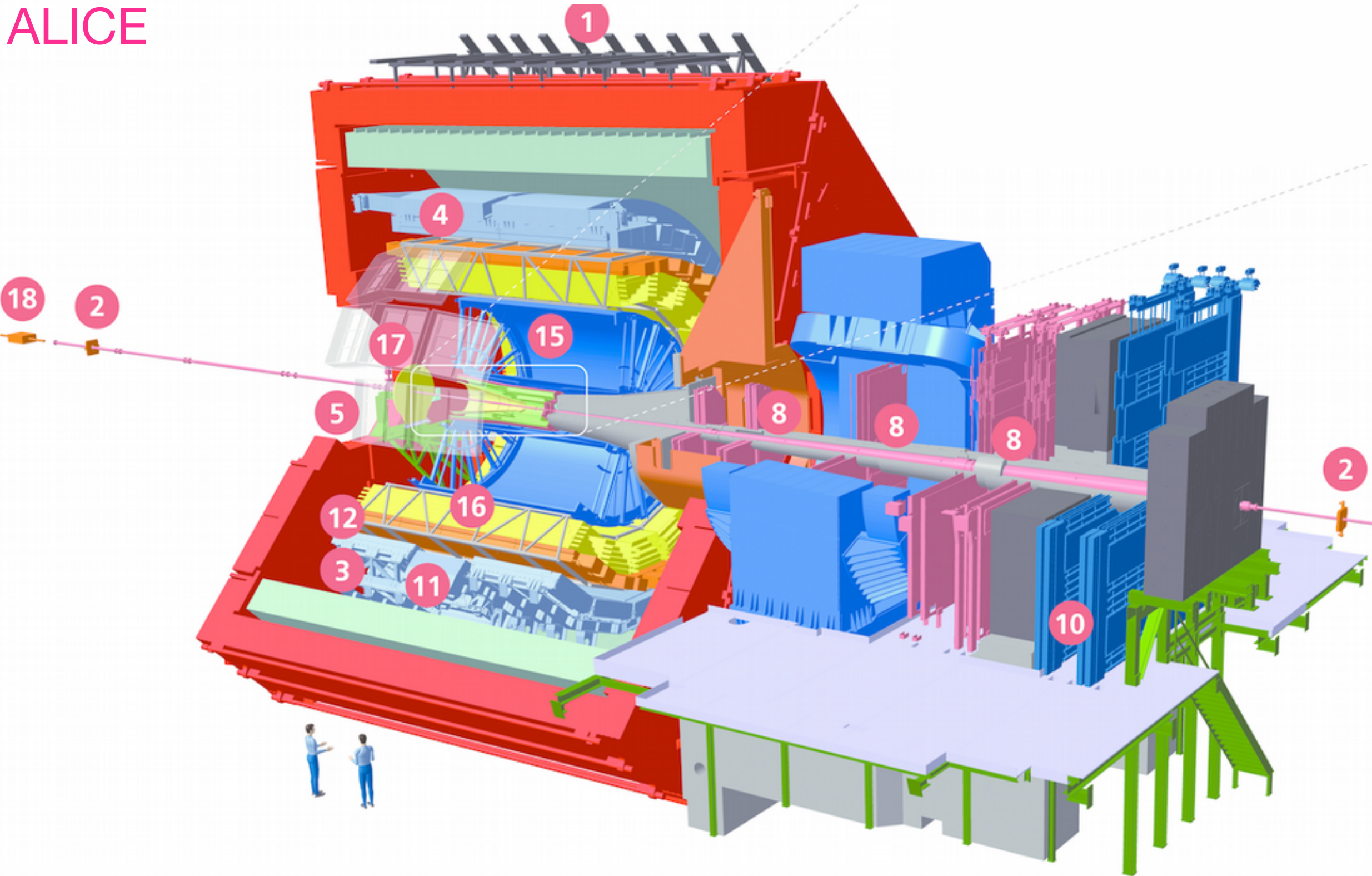
Assemblée générale du GDR QCD  
8-10 March 2021



# Fixed target at ALICE



ALICE

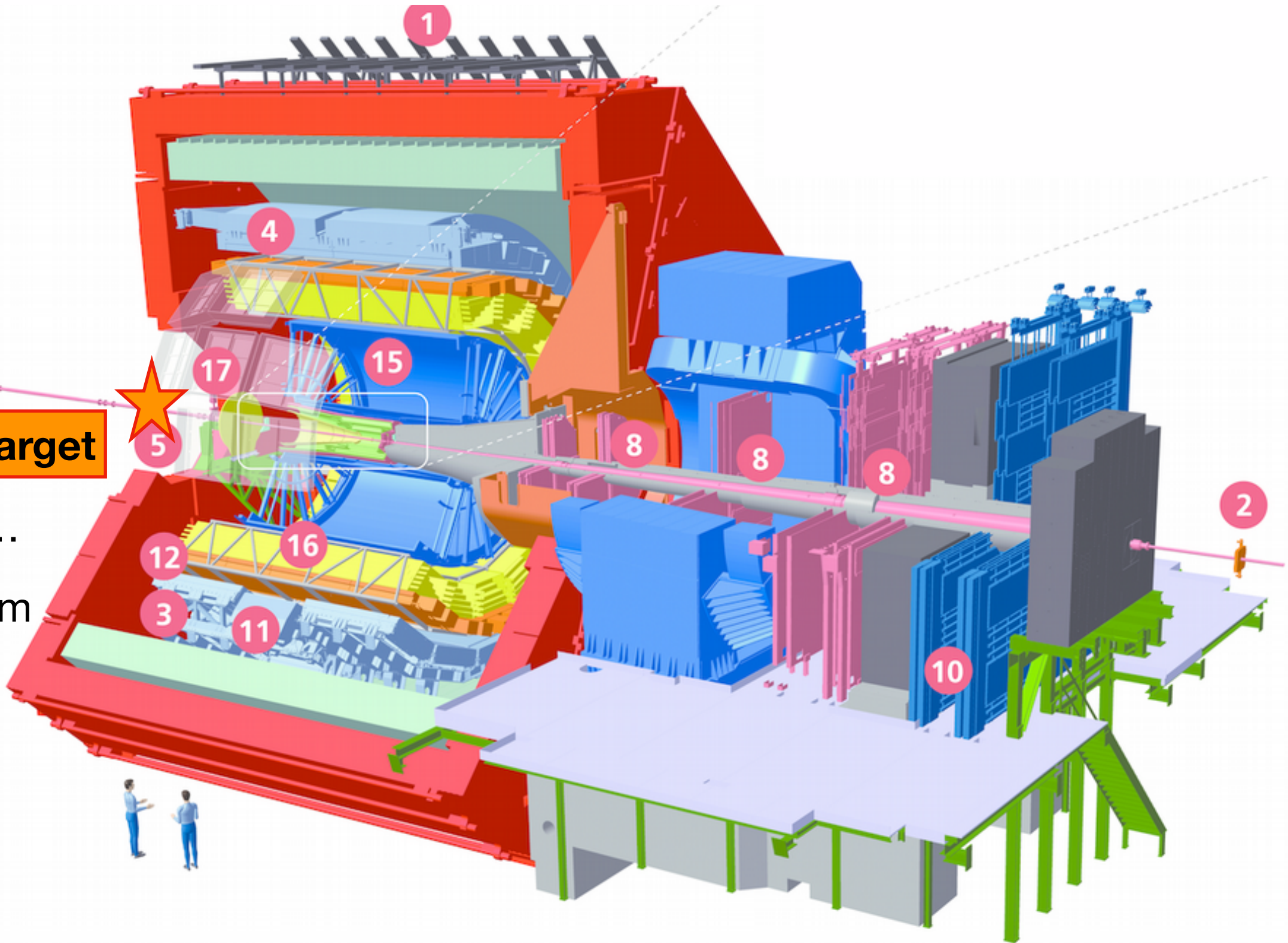




# Fixed target at ALICE



ALICE



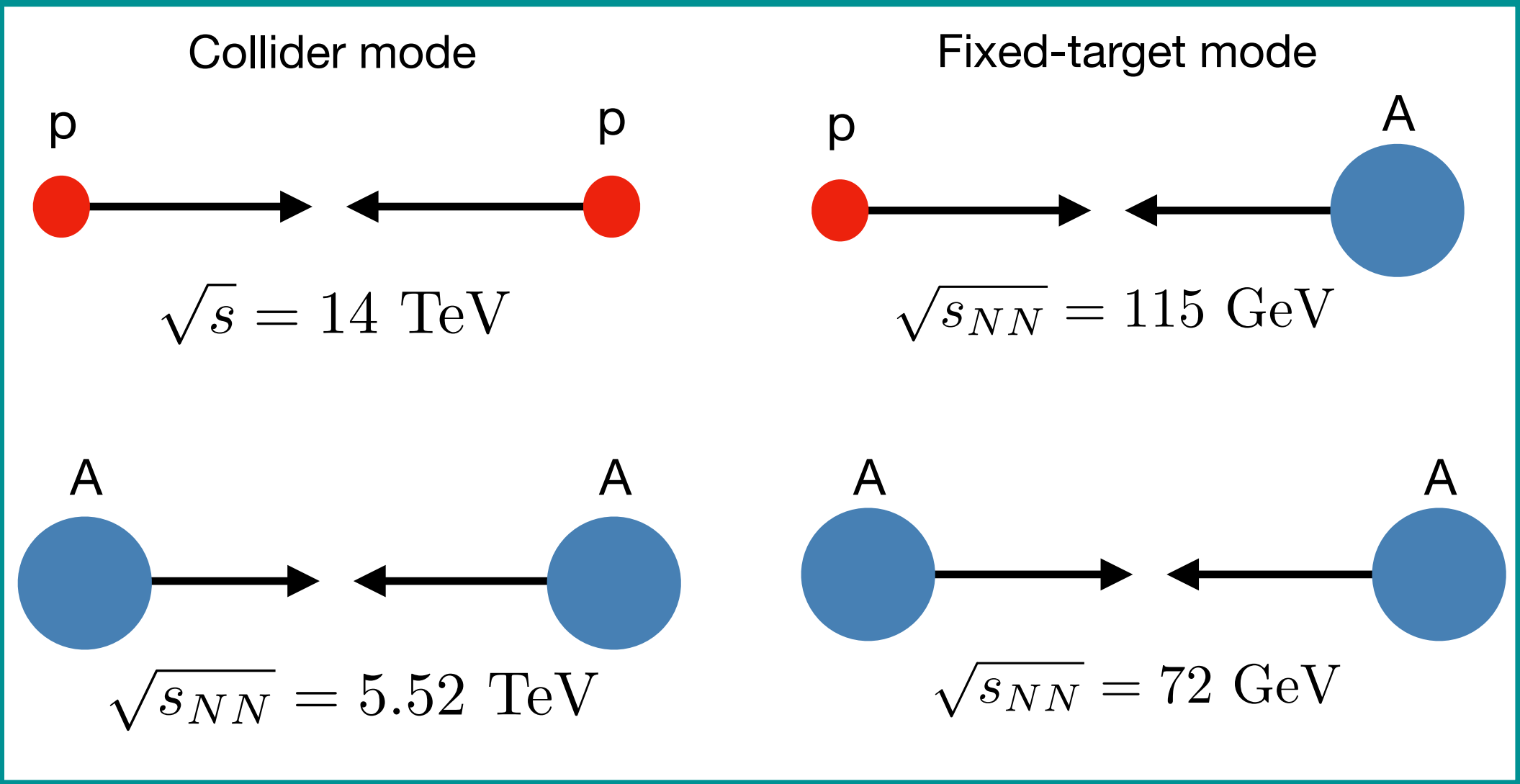
Fixed target

Be, C, Ti, W, ...  
 $10^6$  p/s on 1 cm thick target

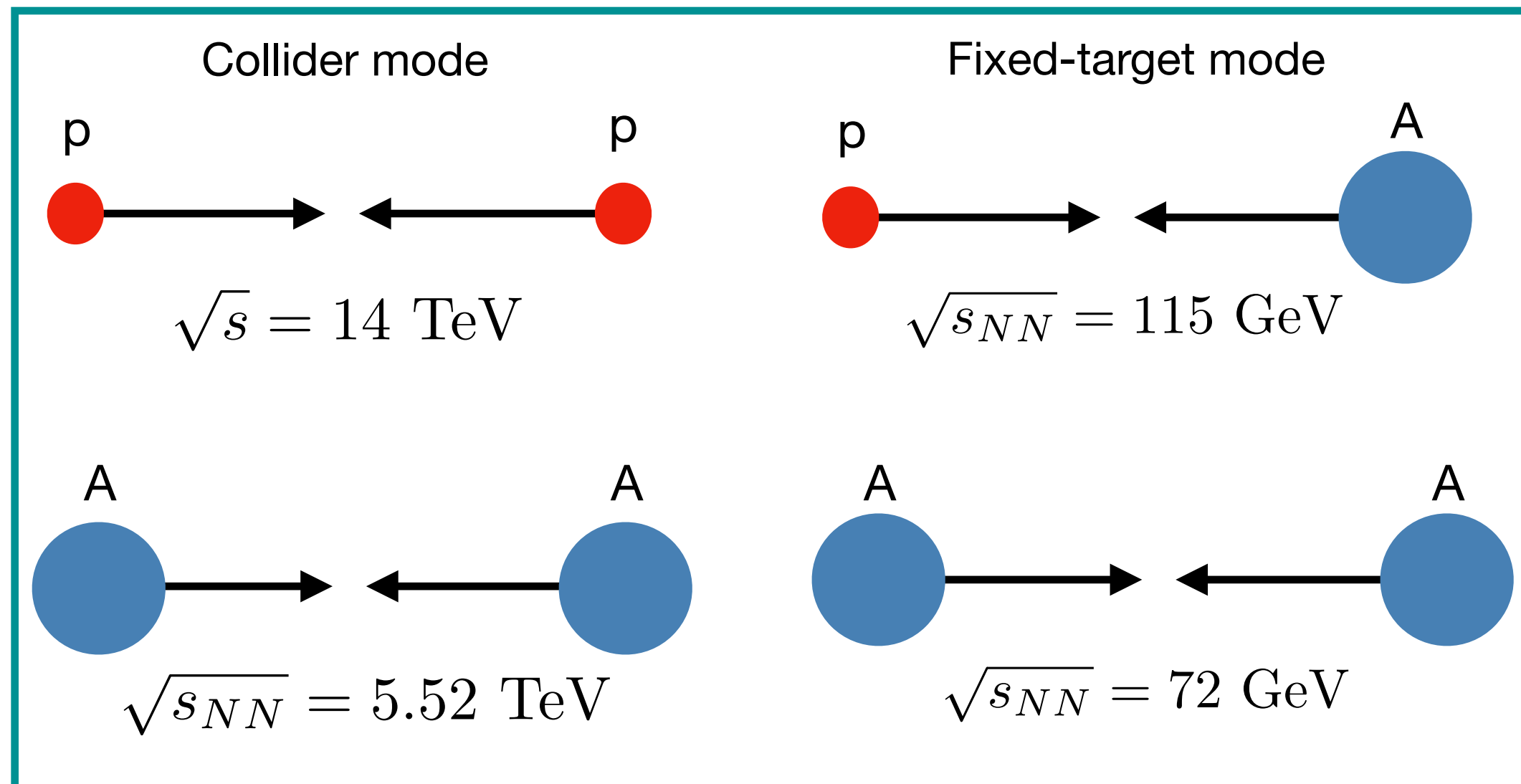
If approved, target installation during LHC LS3 (2025-2027)



# Centre-of-mass energy and rapidity coverage



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ALICE (p - fixed target)

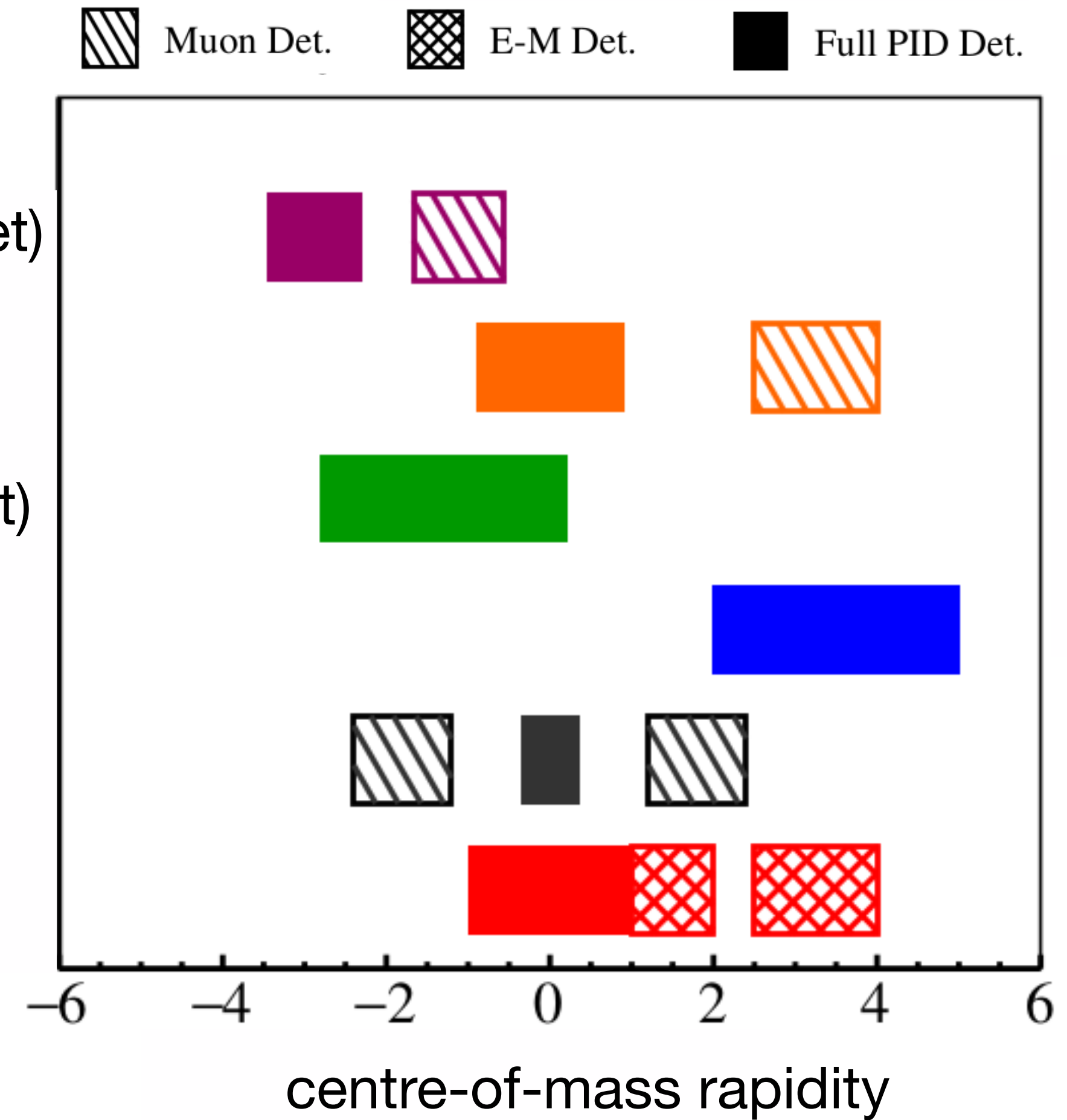
ALICE (Collider)

LHCb (p - fixed target)

LHCb (Collider)

PHENIX (Collider)

STAR (Collider)

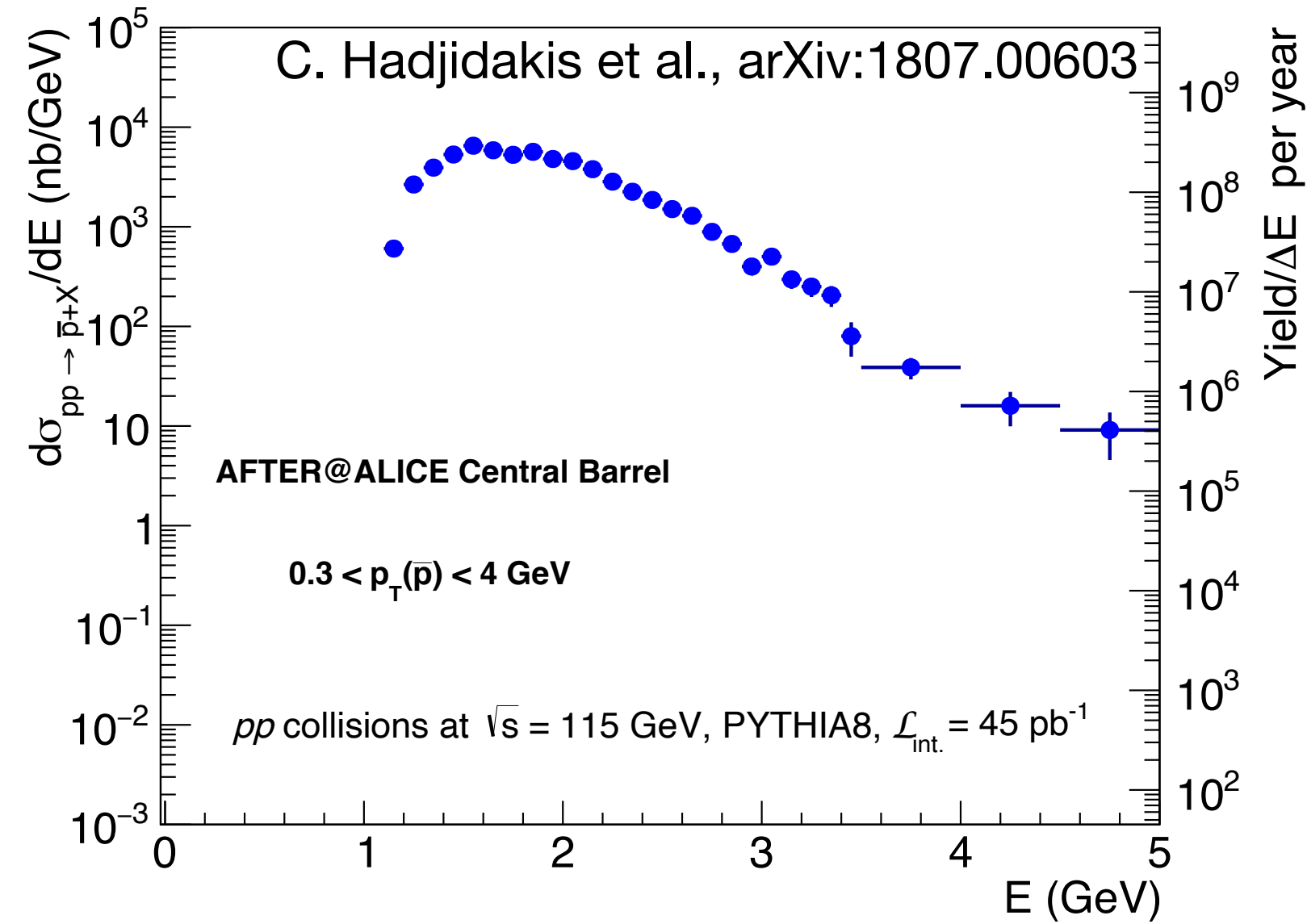


# Selection of physics motivation

- $\bar{p}$  production cross section as input for determination of cosmic  $\bar{p}$  spectrum

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high-E  $\bar{p}$  from interaction of primary cosmic rays (p,  $^4\text{He}$ ,  $^{12}\text{C}$ ,  $^{14}\text{N}$ ,  $^{16}\text{O}$ ) with interstellar matter (p,  $^4\text{He}$ )



slow  $\bar{p}$  from p beam with fixed target of C, N, O, He

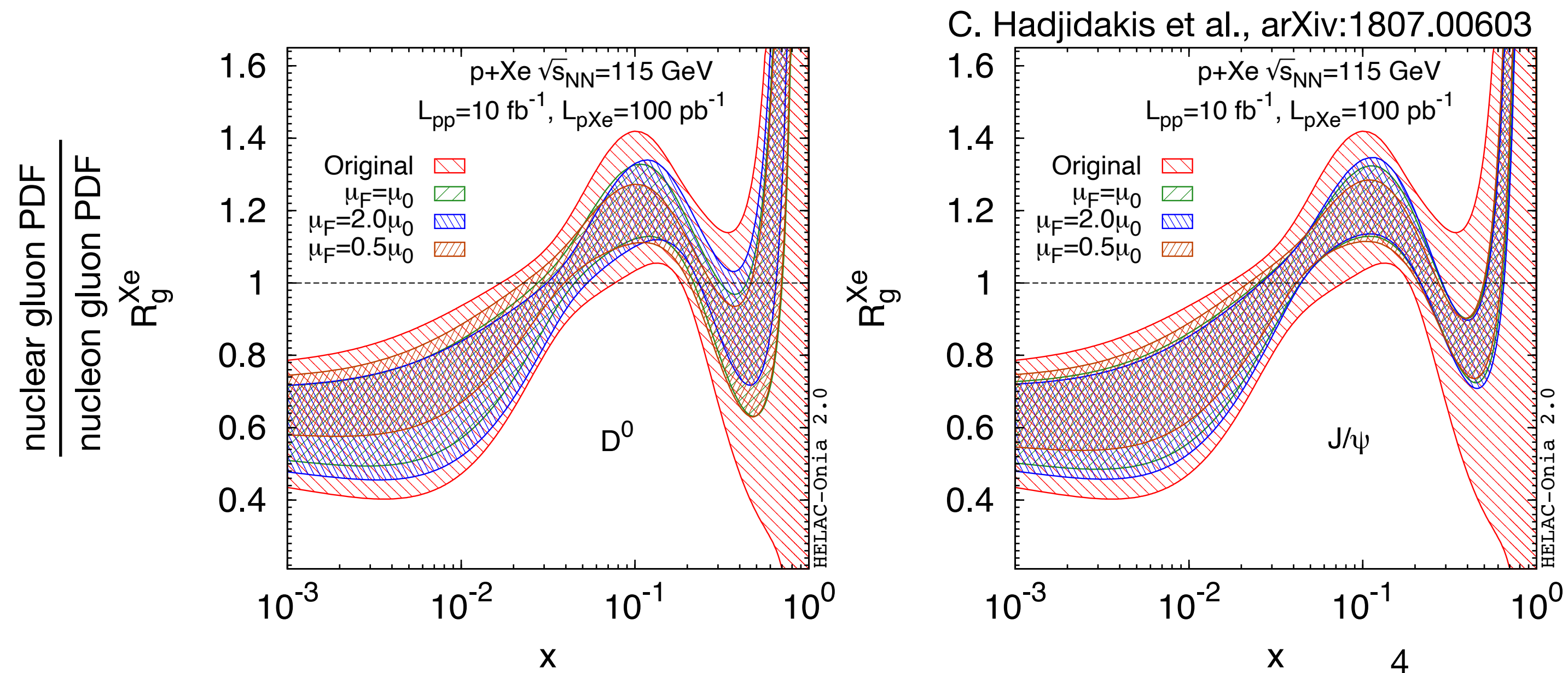
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- $\bar{p}$  production cross section as input for determination of cosmic  $\bar{p}$  spectrum
  
- Centre-of-mass energy between SPS and RHIC: charmonium suppression in AA collisions for study of quark-gluon plasma. ALICE is optimal for study of central AA collisions!

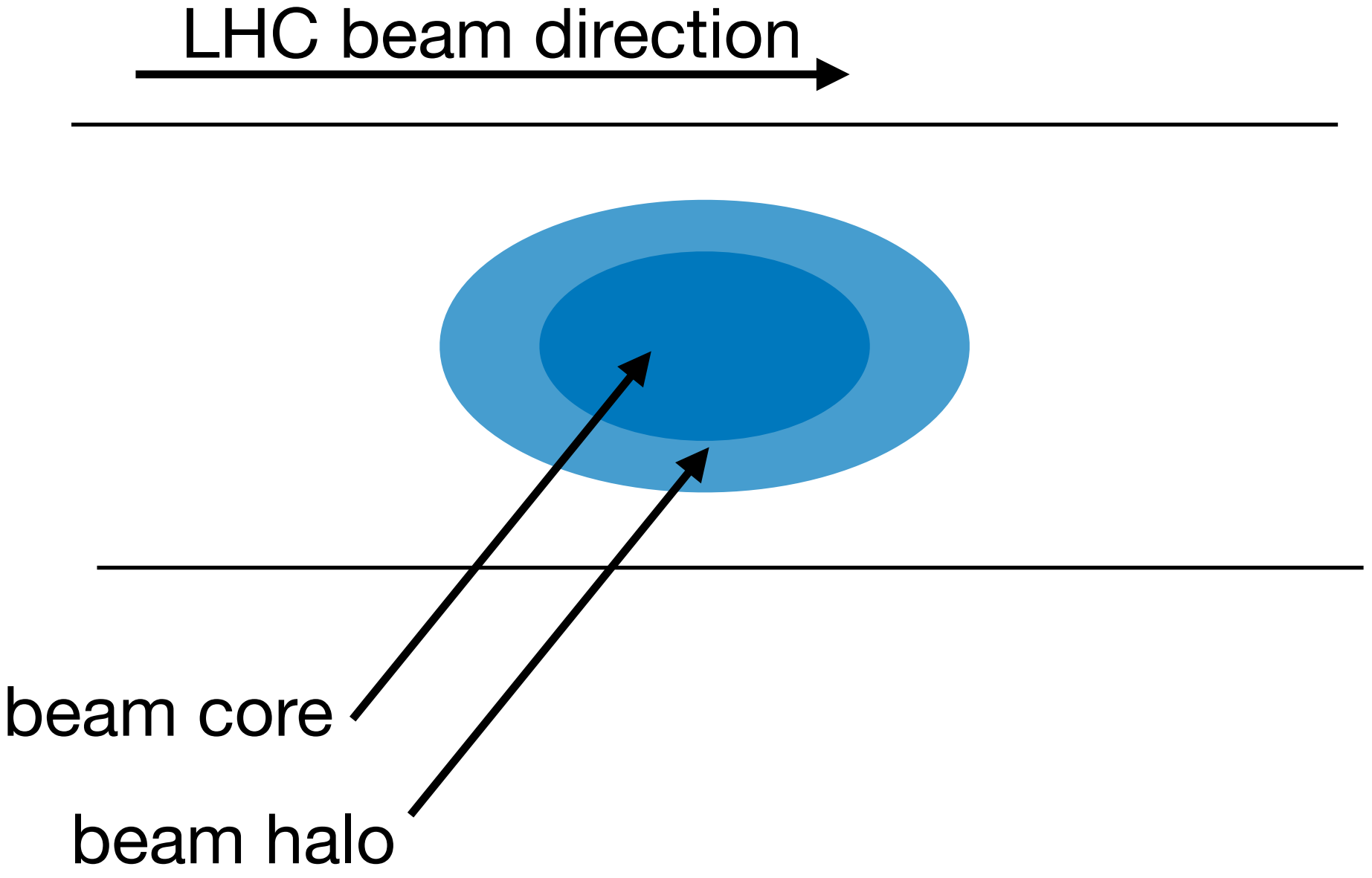


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- Centre-of-mass energy between SPS and RHIC: charmonium suppression in AA collisions for study of quark-gluon plasma. ALICE is optimal for study of central AA collisions!
- Backward centre-of-mass rapidity  $\rightarrow$  high- $x$  nuclear PDFs, TMD PDFs and GPDs, where uncertainties are very large!

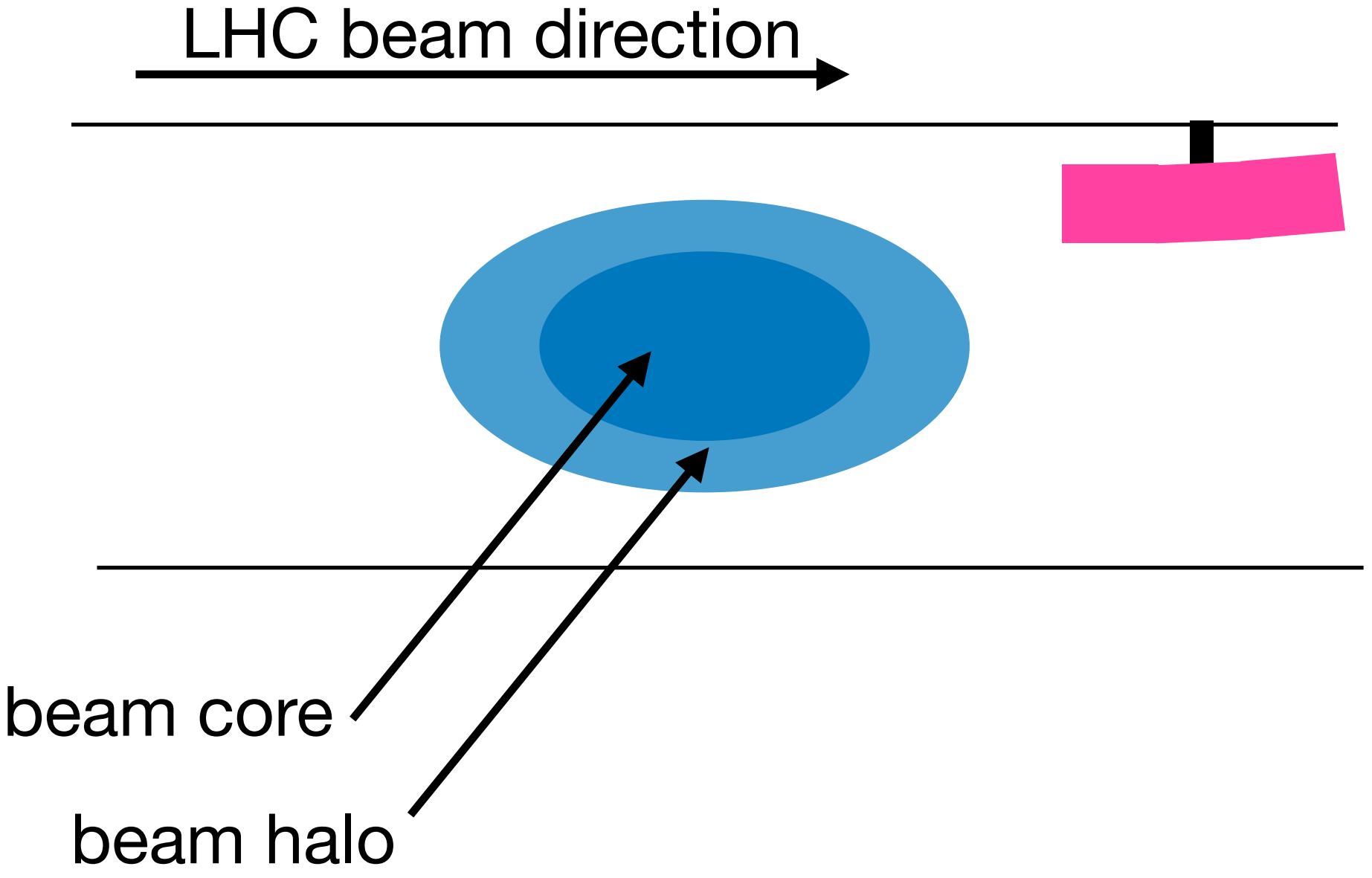


# Realisation of beam interaction with fixed target

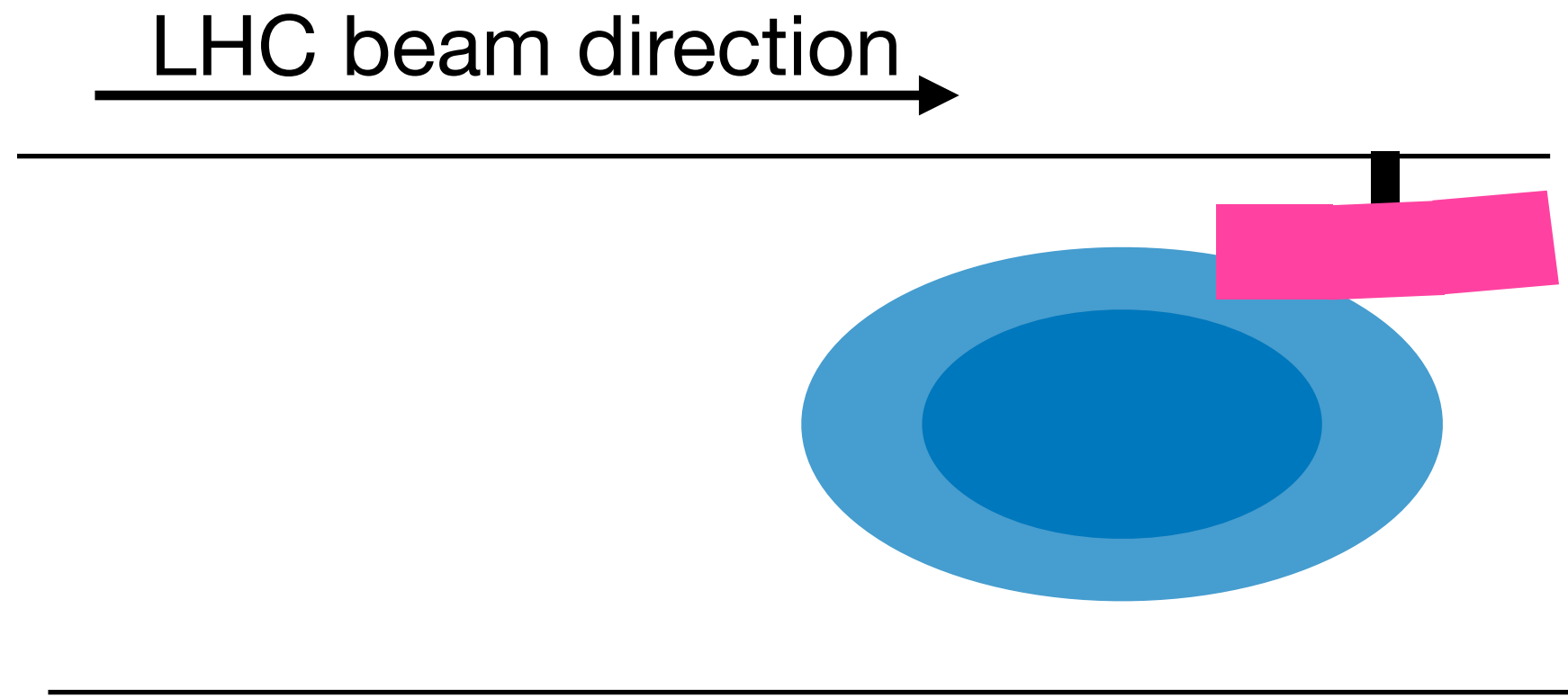




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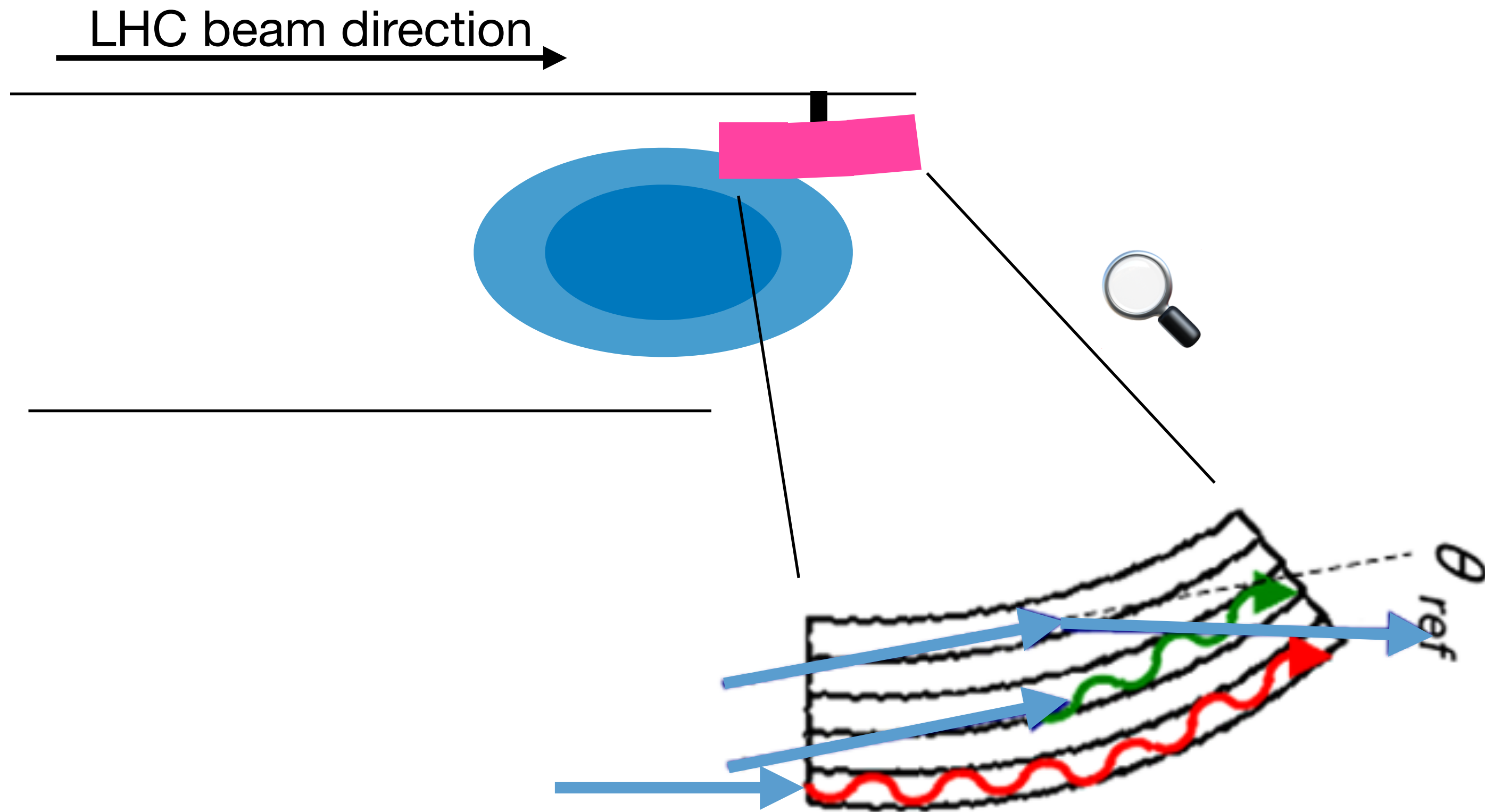


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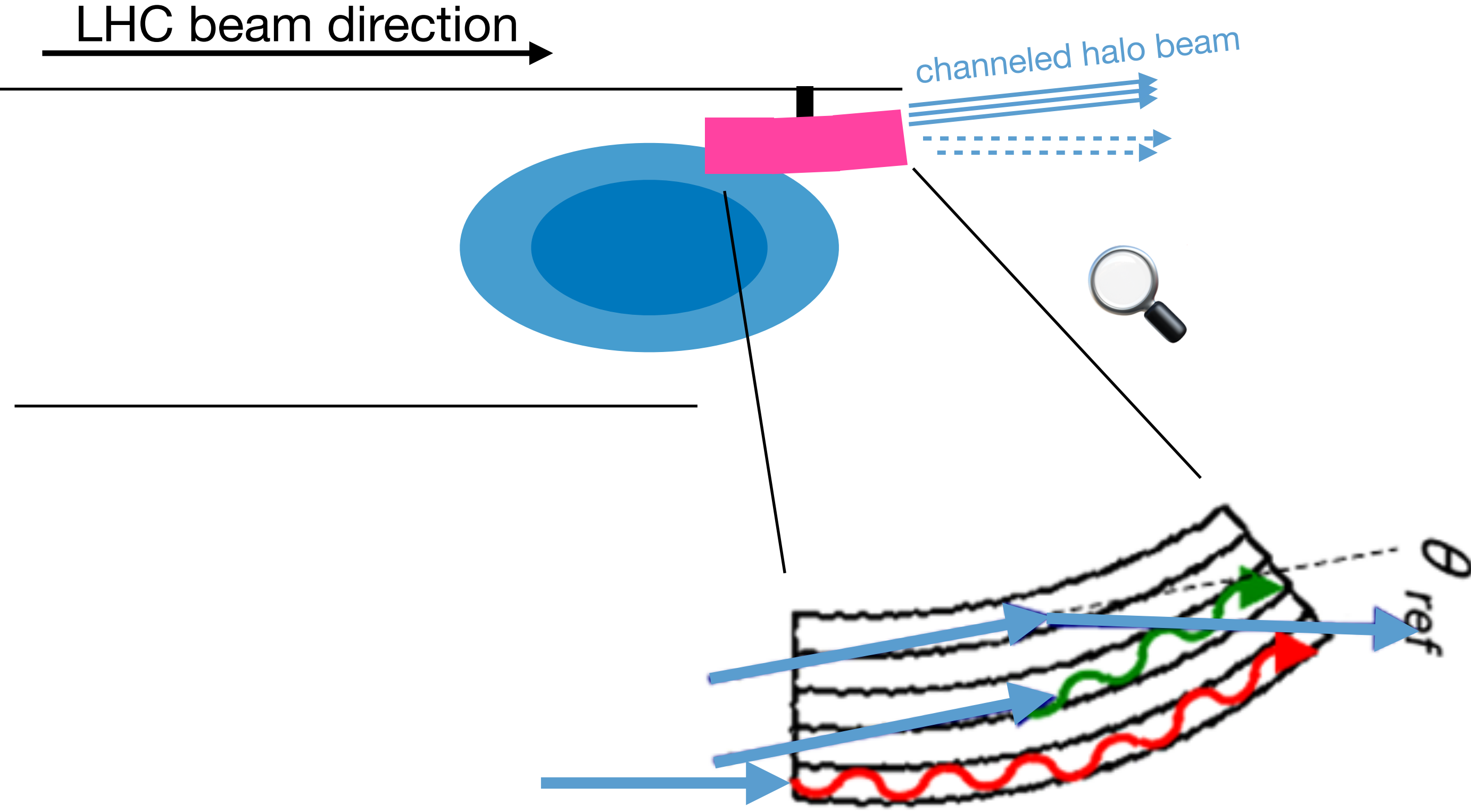




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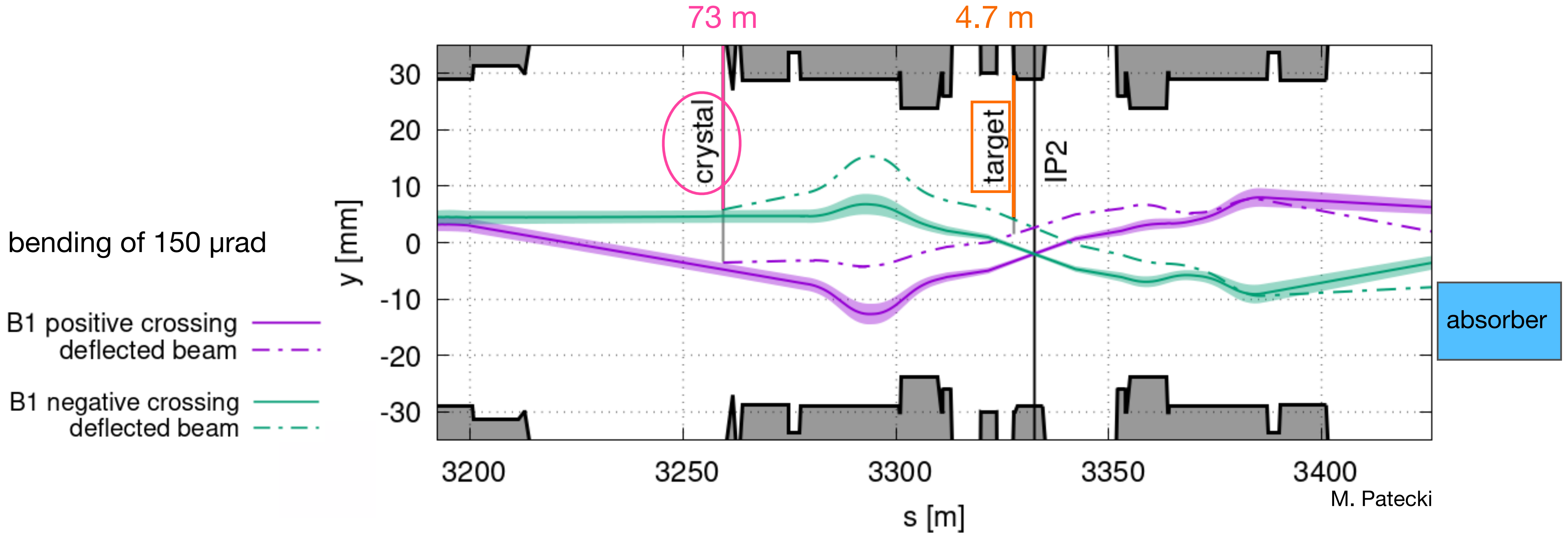
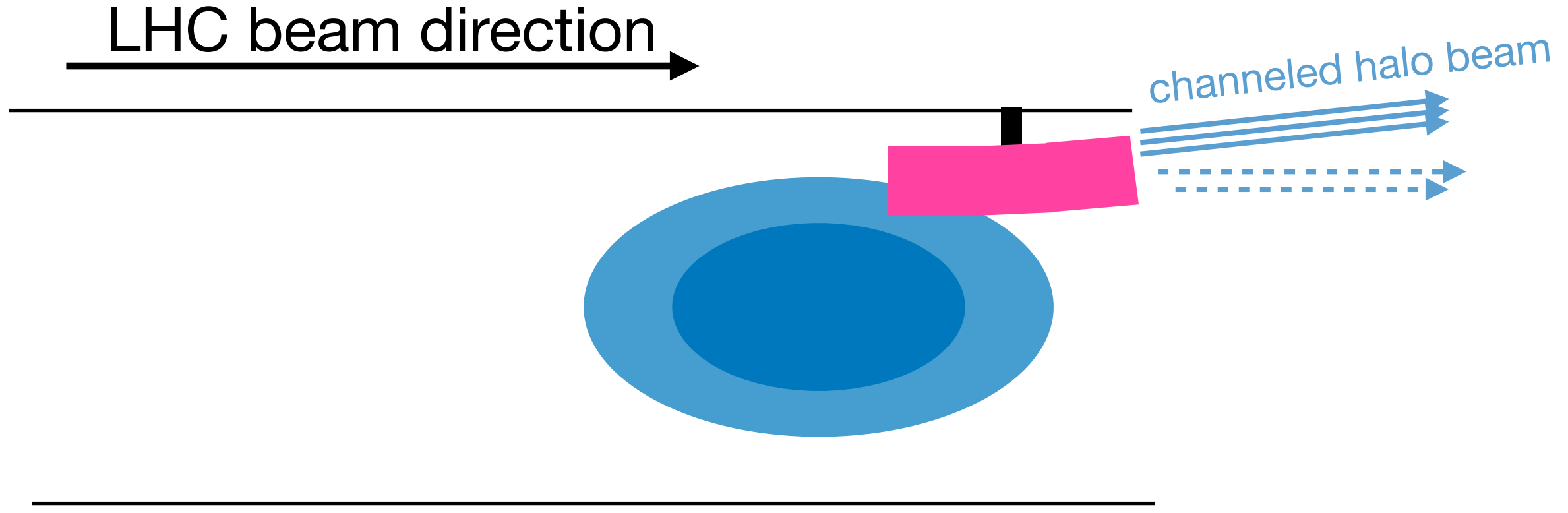


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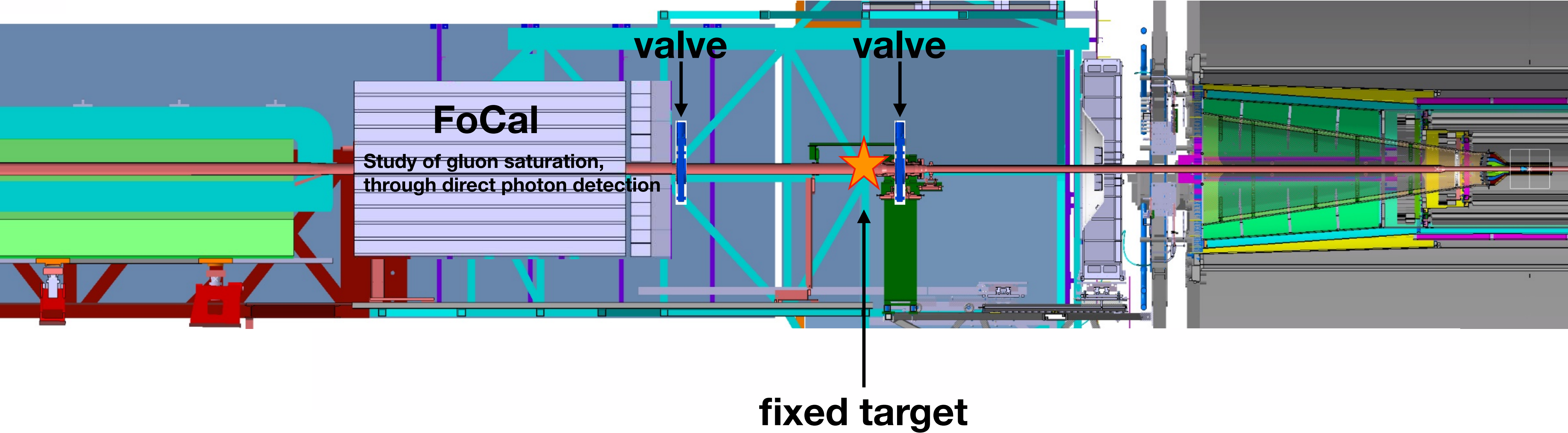


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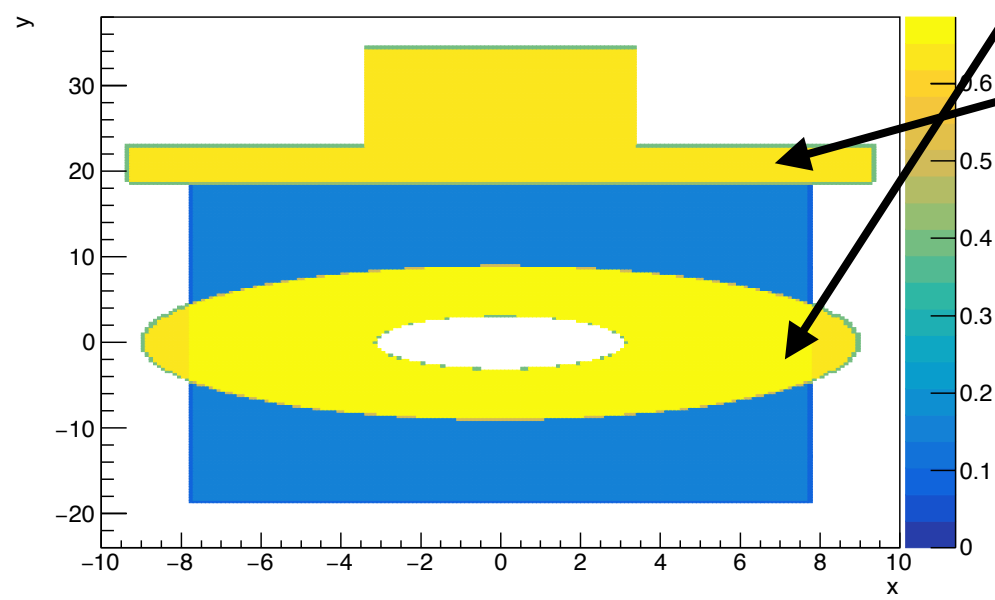
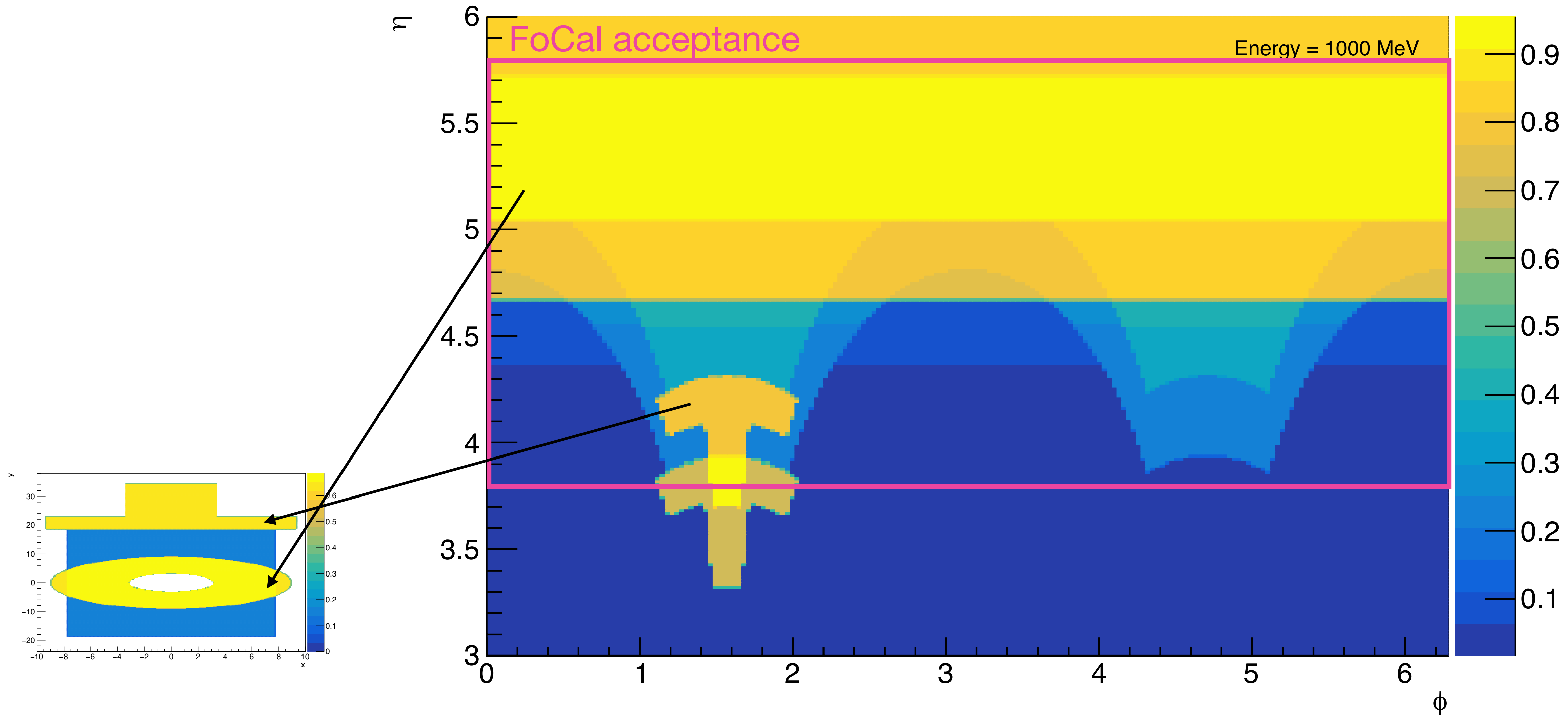
# Fixed target and FoCal: original concept

**ALICE**



# Impact of valves on FoCal: original concept

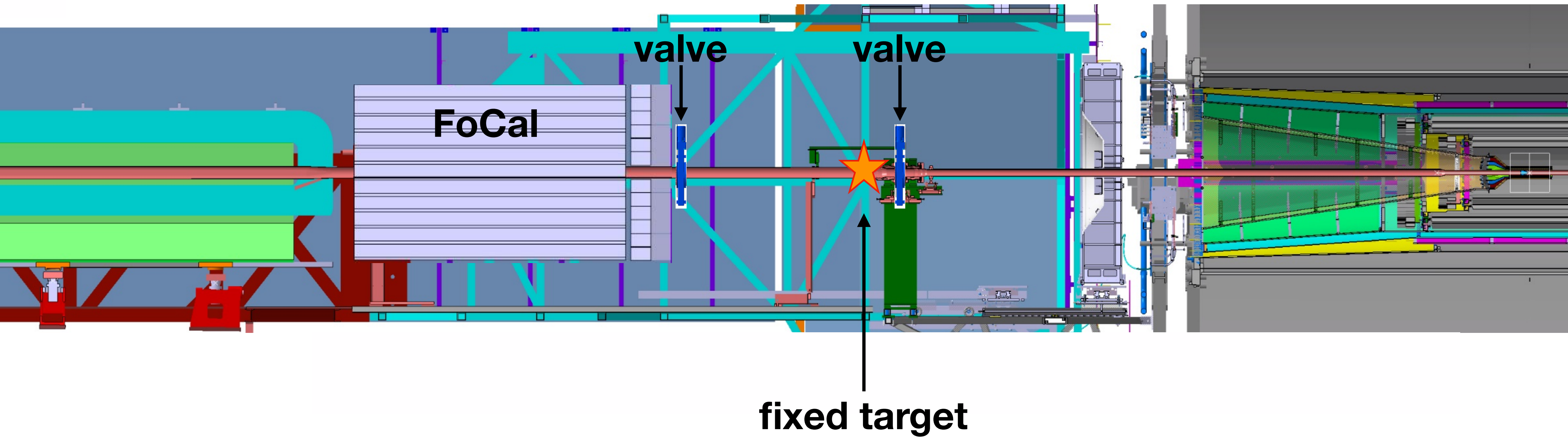
Photon interaction probability





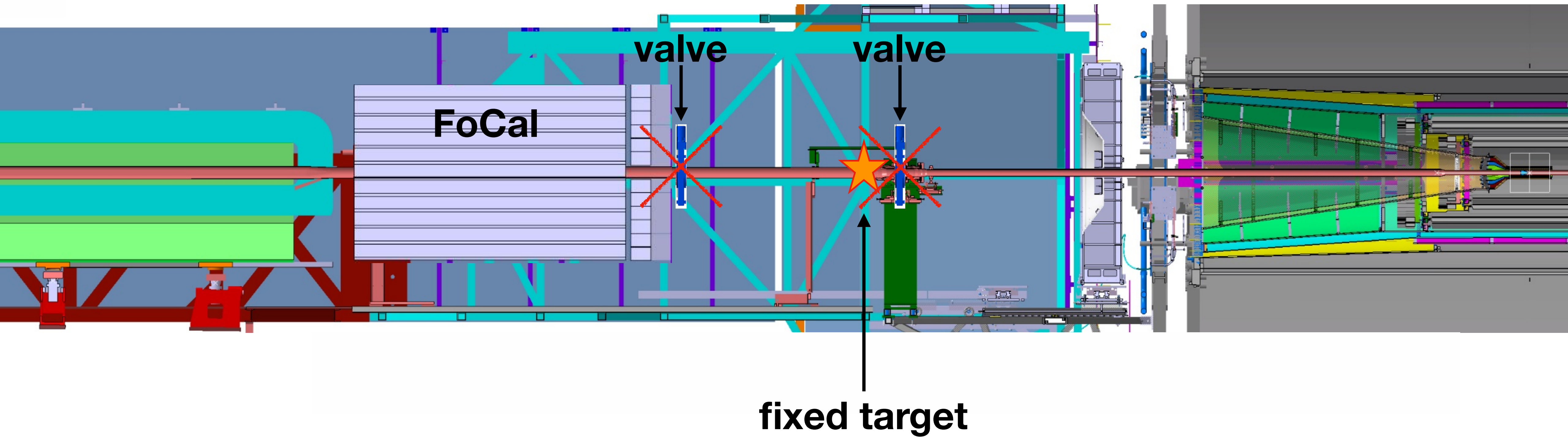
# Fixed target and FoCal: new concept

**ALICE**



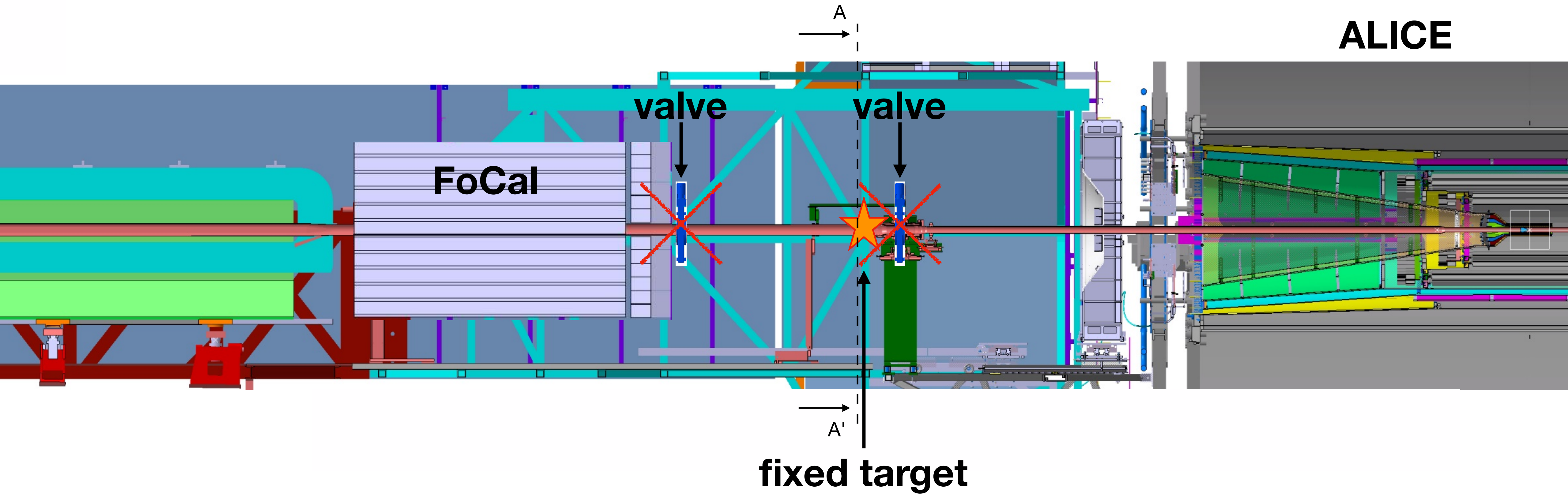
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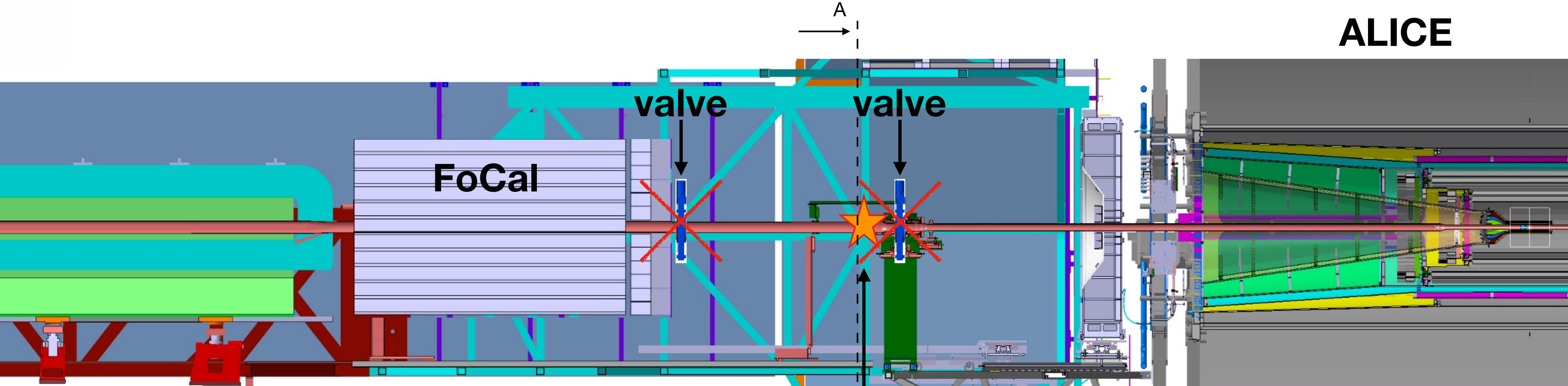


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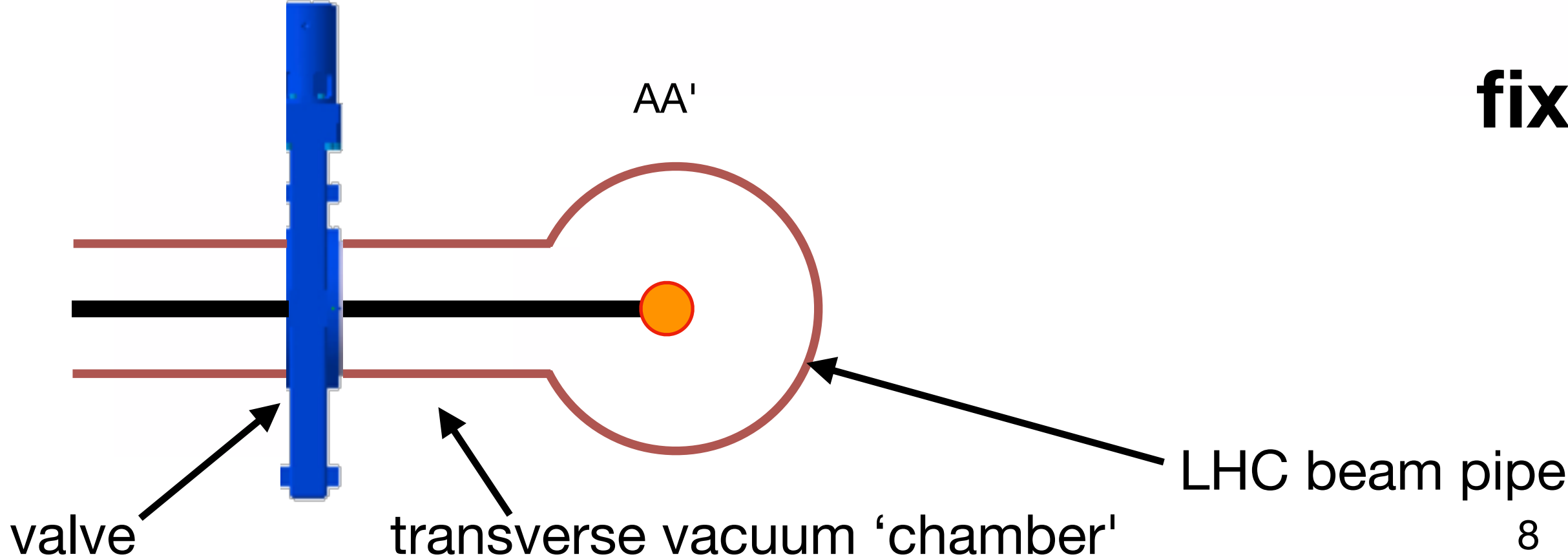


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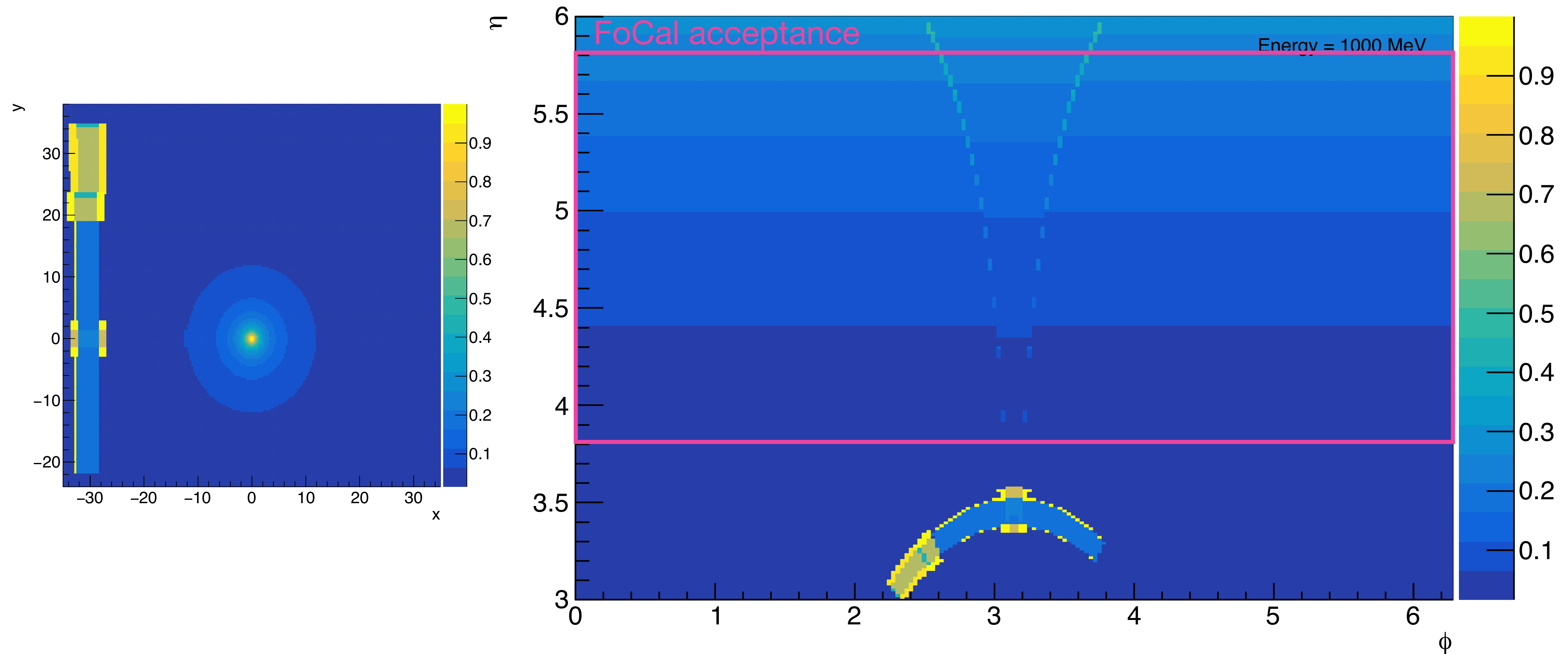
**ALICE**

**fixed target**



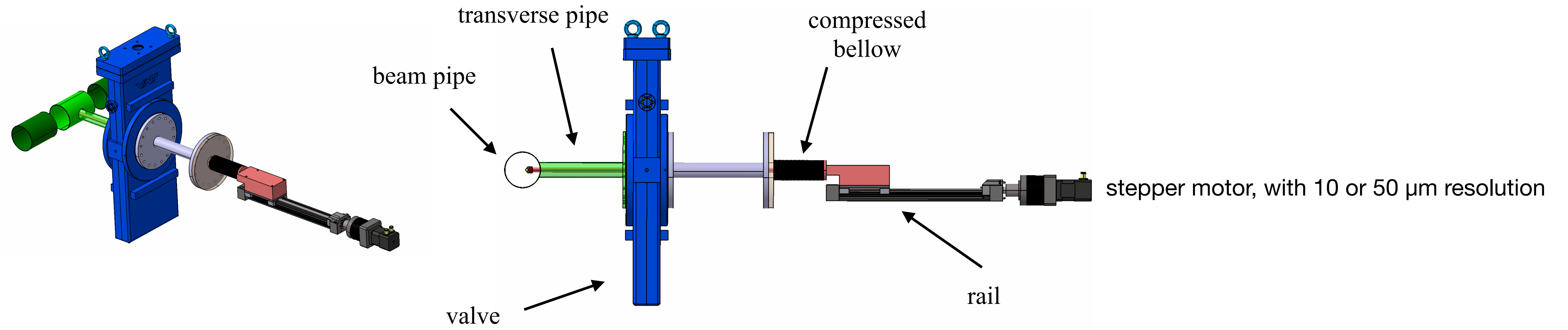
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Photon interaction probability



# New design of target in progress

K. Pressard





# Status summary of fixed-target programme

- Bent-crystal collimation studies in progress
- Target-system design finalisation in progress
- Simulation studies of impact of target implementation in progress
- Data acquisition and reconstruction studies in progress
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Thank you for your attention