

# Forward Proton Detectors in Heavy Ion Runs

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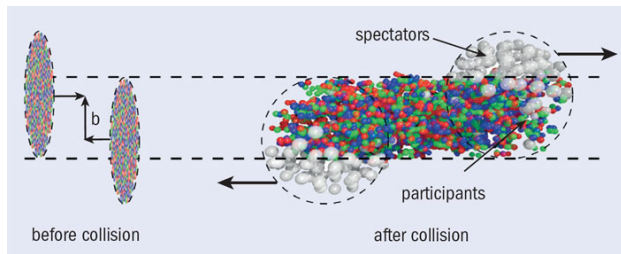
**Low-x Meeting 2016**

**6 – 11 June 2016**

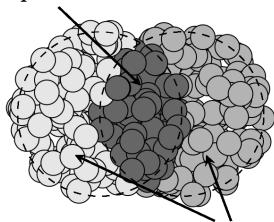
# Heavy ion collisions

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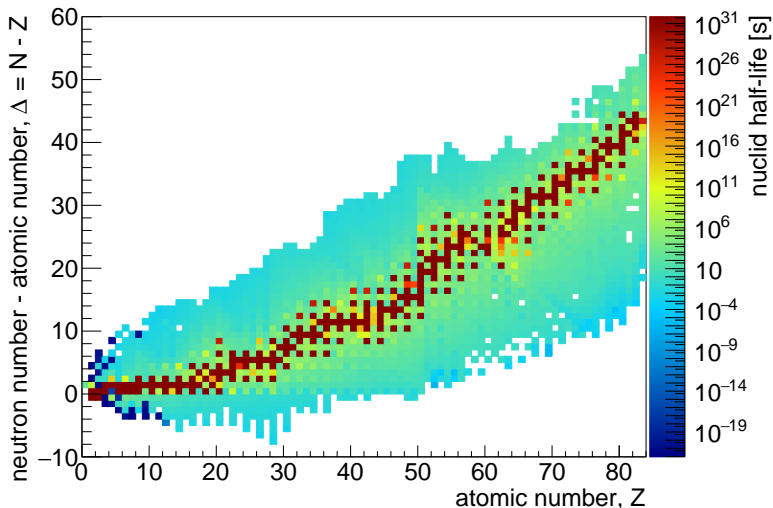
participant nucleons



spectator nucleons

# Half-life of nuclides

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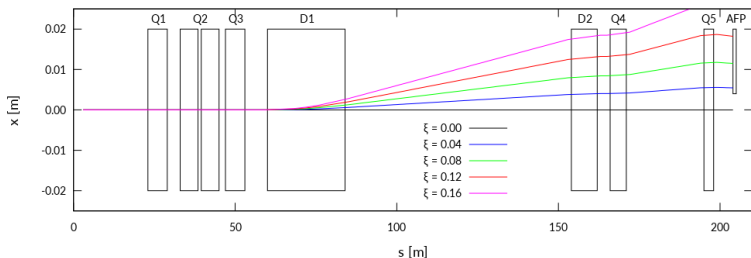


Proper time between production and reaching AFP:  $\sim 0.3$  ns

# Transport

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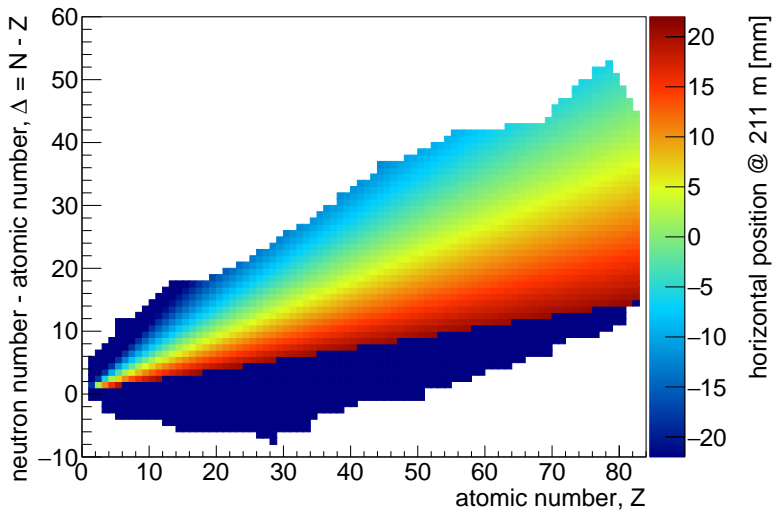
- MadX, up to my knowledge, only allows to transport particles of the beam
- Trick: find the momentum of the beam particle that would have the same trajectory as the particle in question

$$p' = \frac{q_{\text{beam}}}{q_{\text{particle}}} p_{\text{particle}}$$

# Position in AFP

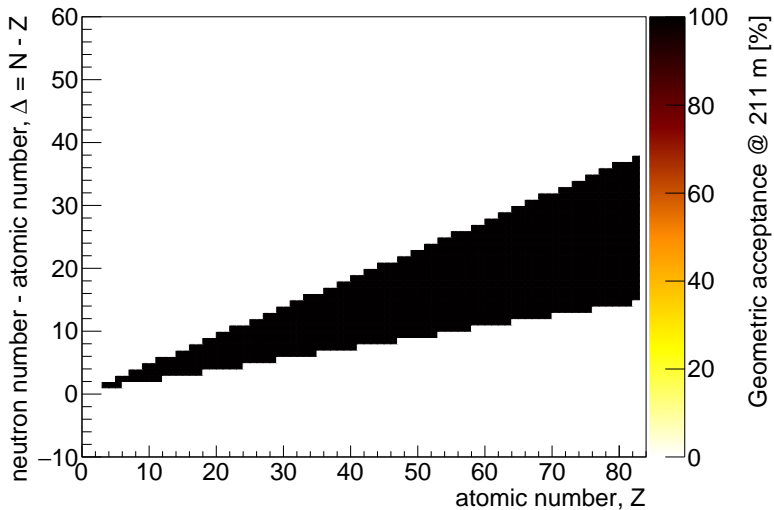
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# Acceptance

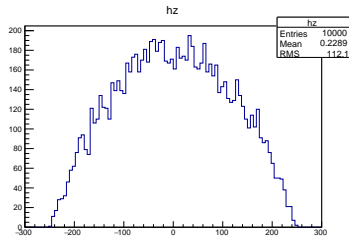
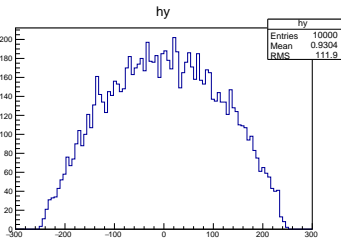
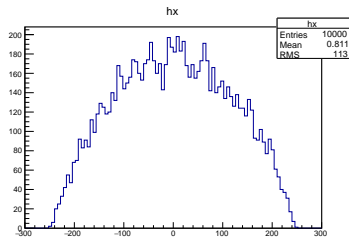
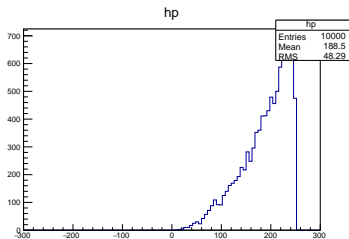
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# Momenta of nucleons – Fermi gas model

Forward Proton  
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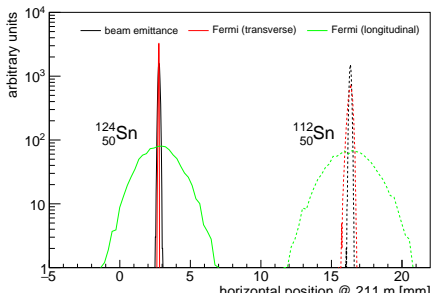
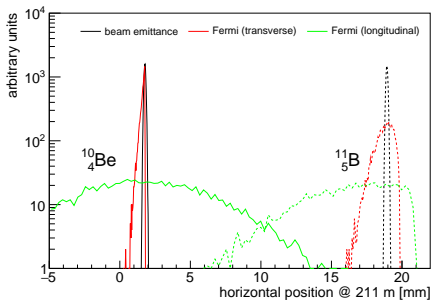
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# Spread of positions

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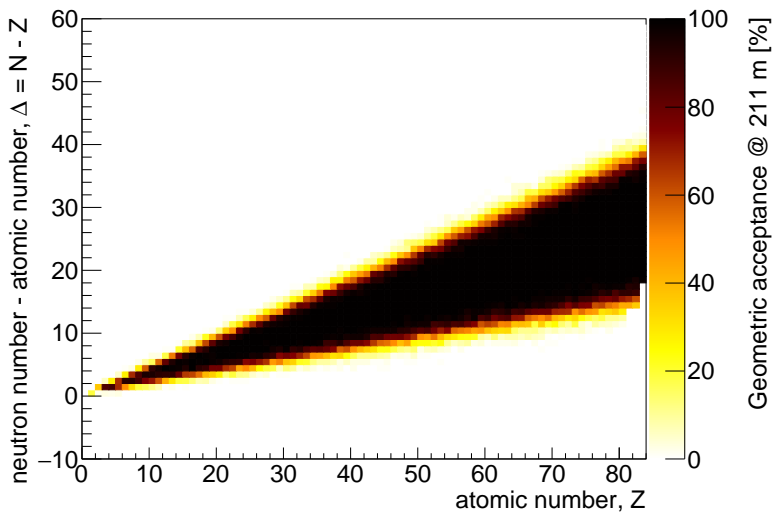




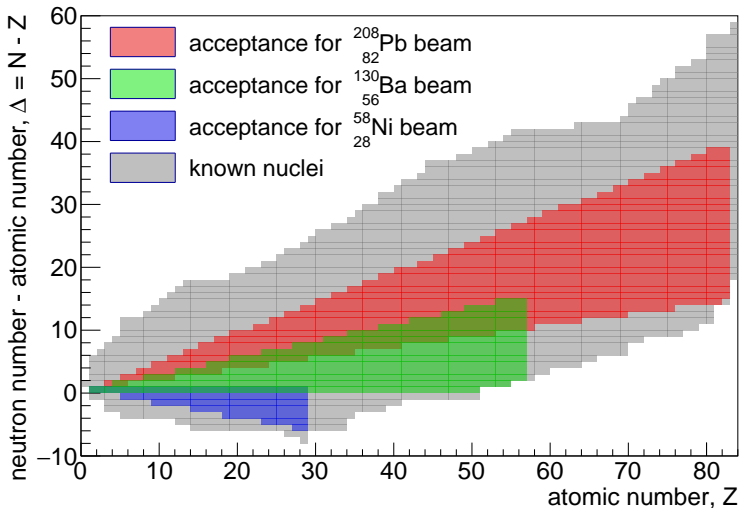
# Acceptance with spreads

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# Acceptance for other beams



# Summary

- Forward proton detectors can potentially detect nuclear debris emerging in HI collisions from spectator nucleons
- New type of measurements?
- Measurement may be interesting from nuclear physics point of view
  - Very large Lorentz factor  $\rightarrow$  possibility of observation of ultra-short lived nuclei
  - Acceptance to different nuclides can be extended by using different ions in the beam
- It may allow centrality determination in HI collisions
- Motivation for additional stations?