WASA analysis for hyper-nuclei

Super-FRS EC Meeting

16 December 2022

university of groningen

GSI

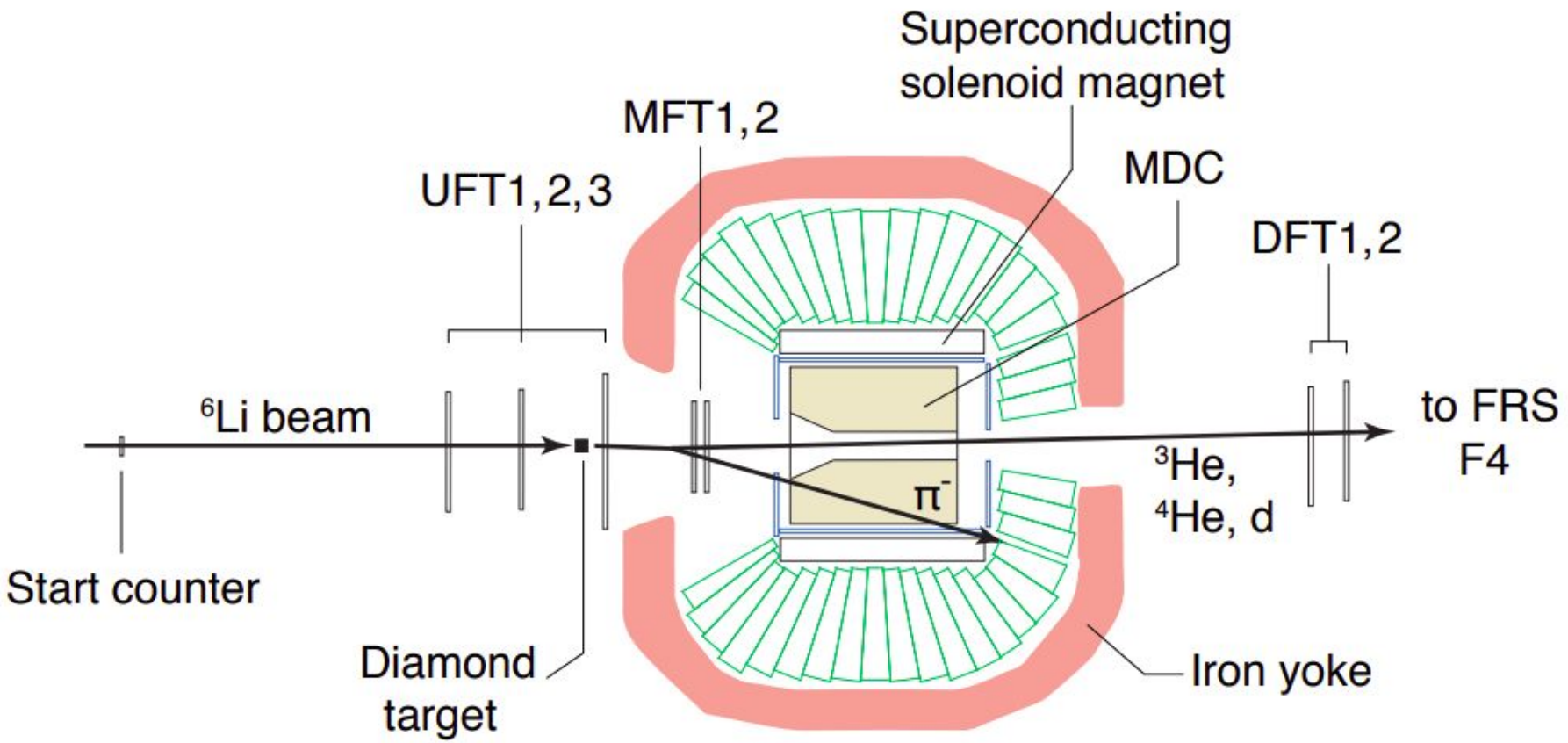
RIKEN

HENP

High Energy Nuclear Physics

Vasyl Drozd

Setup



- WASA tracking (MFT1,2+MDC+PSB) for **π^-**
- Optics analysis from FRS-S4 for **^{3}He, ^{4}He, d**

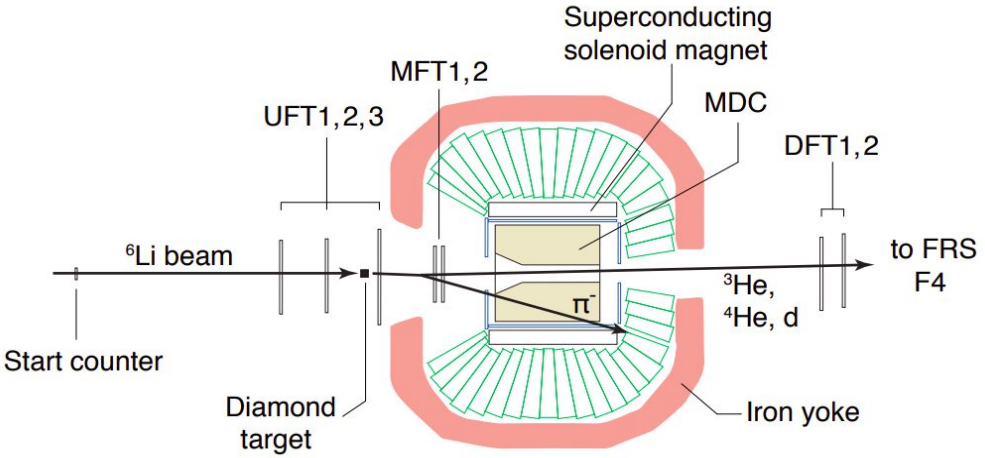
Fiber detectors alignment

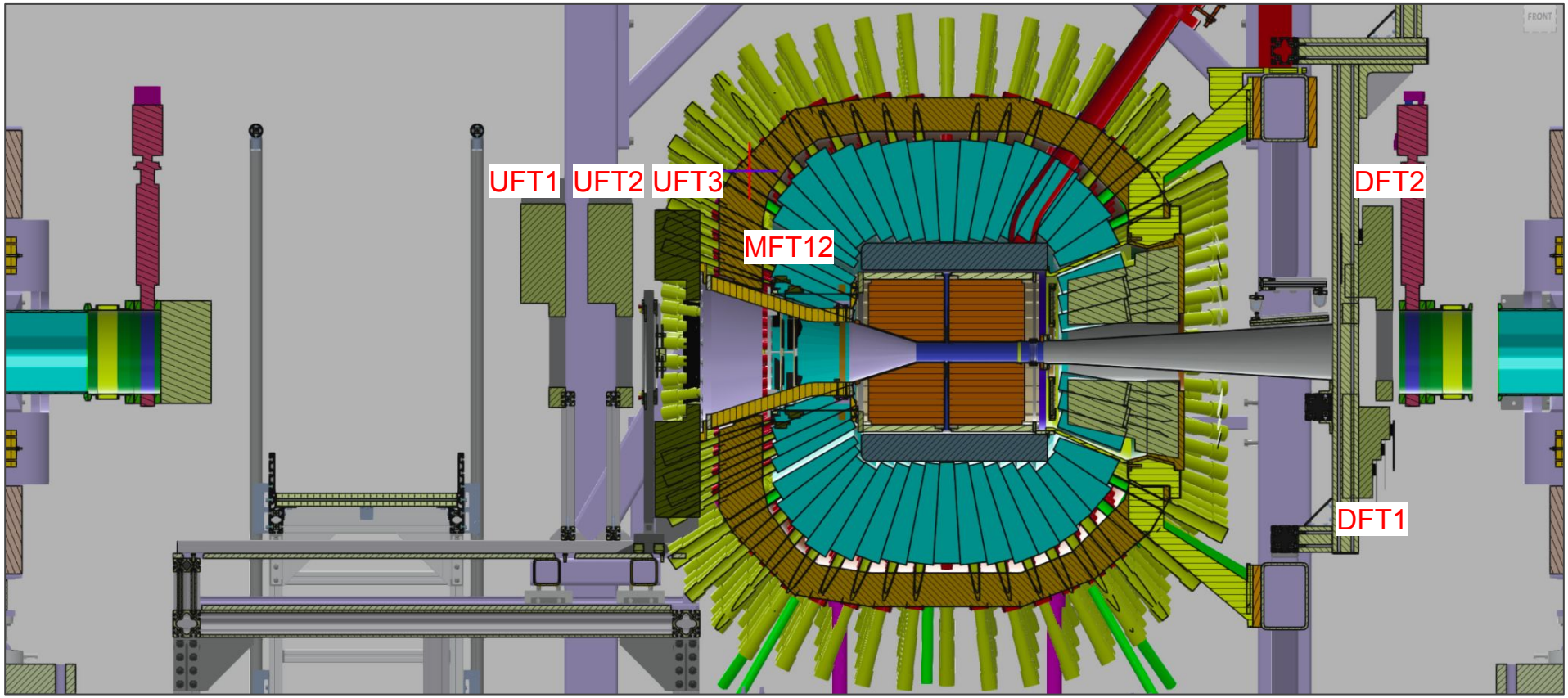
5 Fiber Detectors:

- UFT1,2 - before target;
- UFT3 just after target;
- DFT1,2 - after WASA.

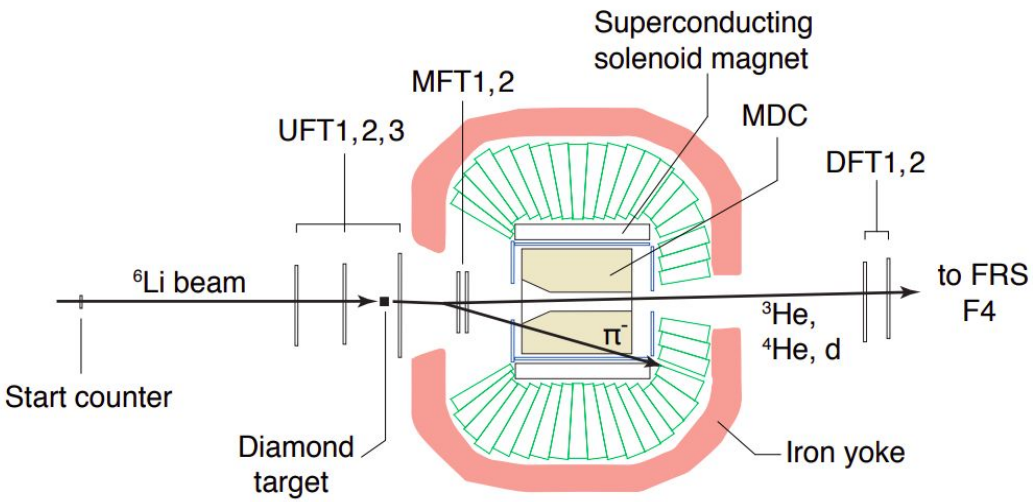
2 Mini Fiber Detectors:

- MFT1,2 - inside WASA iron yoke;

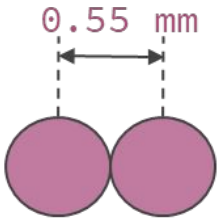


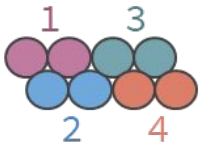


Detectors alignment (Parameters that was tuned during alignment)



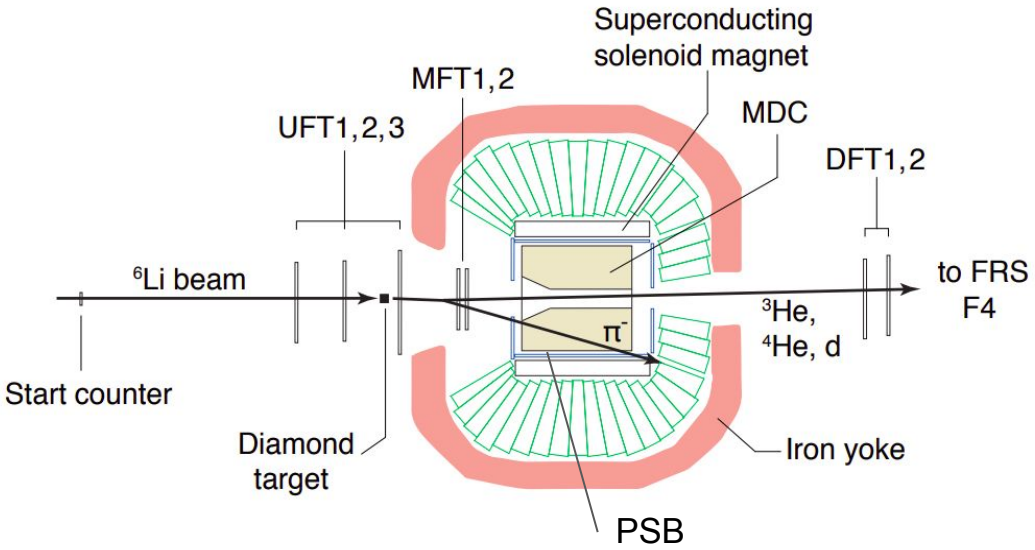
Fiber detectors (UFT1,2,3, DFT1,2)
- Individual fiber offset (256x3 in each detector)
- Position XYZ





Mini Fiber (MFT1,2)
- Position XYZ
- Layer angle
- Individual fiber offset

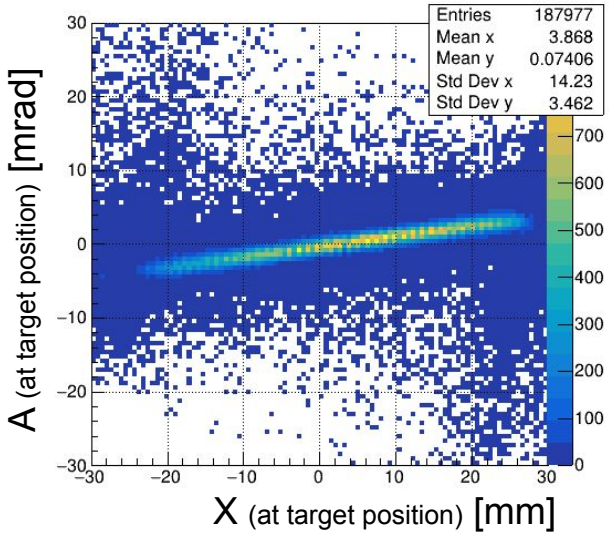
Detectors alignment (Parameters that was tuned during alignment)

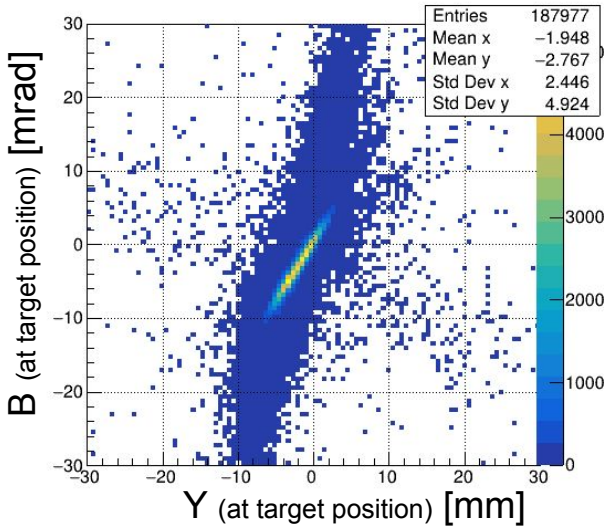


MDC
- Position XYZ
- Rotation XYZ

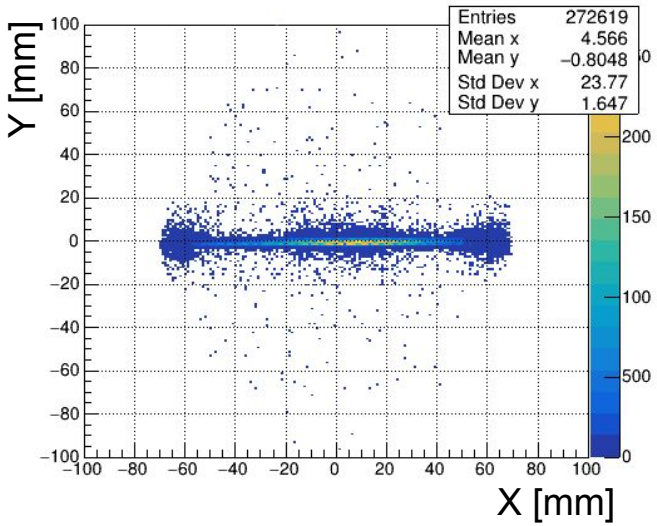
PSB
- Position XYZ
- Rotation Z
- Z offset

The beam condition, that was used for fiber detectors alignment

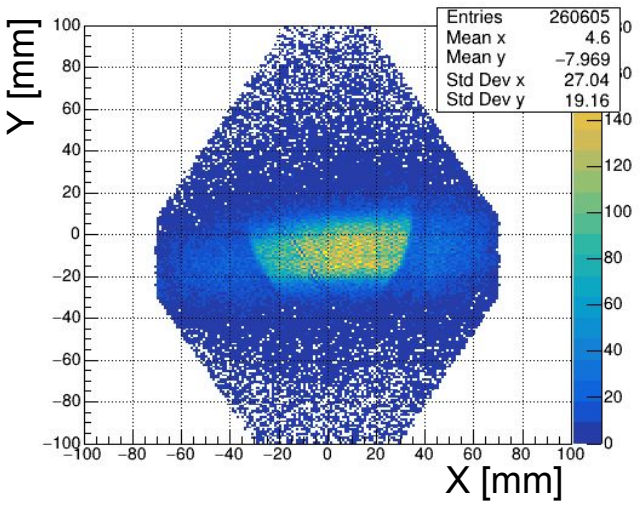




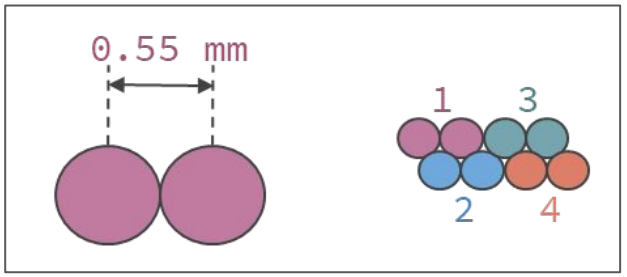
UFT1 Hit position



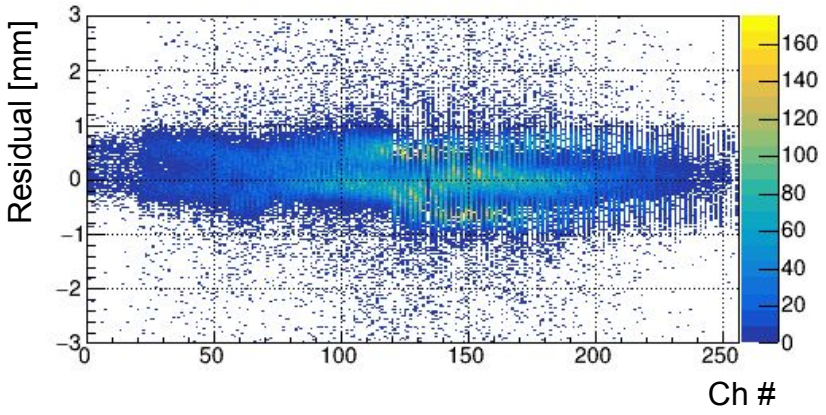
DFT2 Hit position

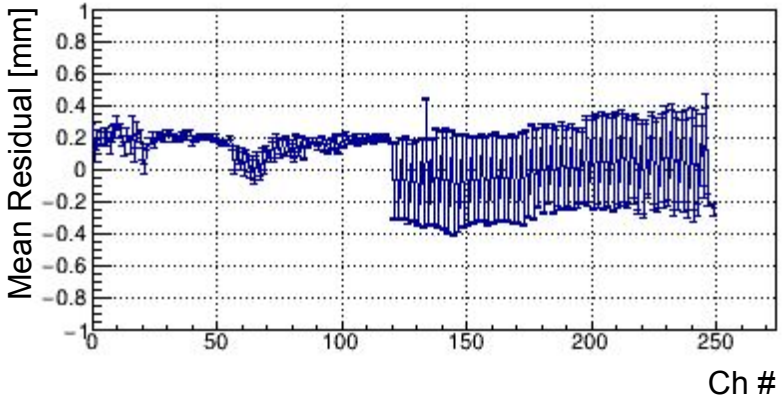


Mini fiber (UFT1,2,3 DFT1,2) alignment

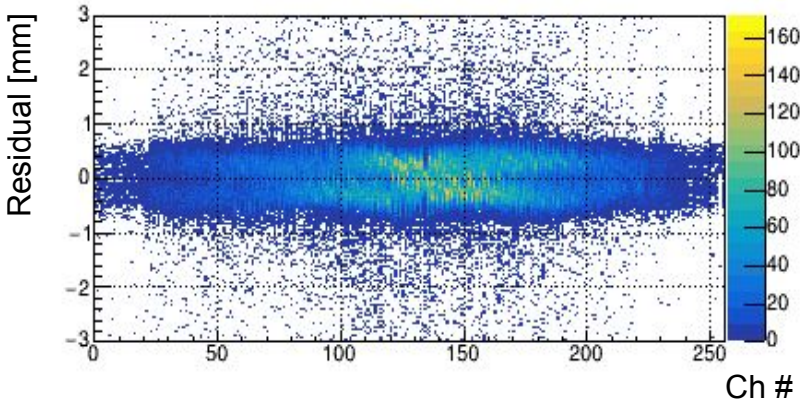


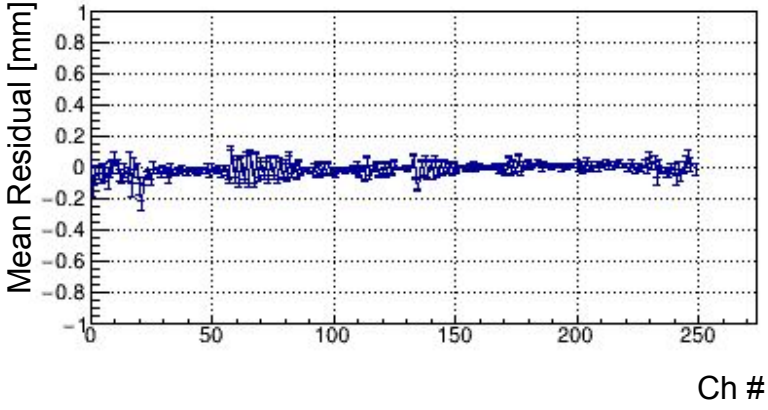
Typical residual before alignment





Typical residual after alignment

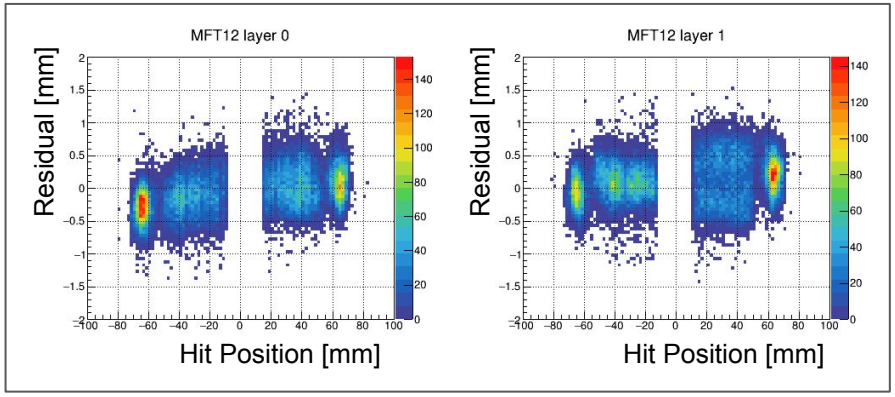




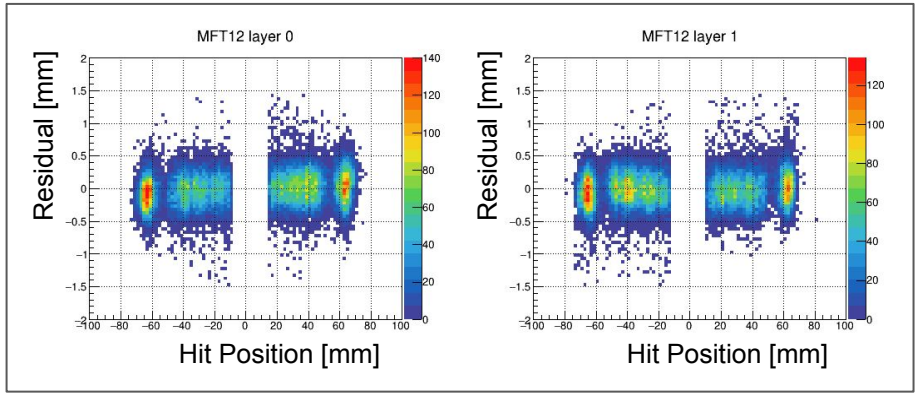
Mini fiber (MFT1,2) alignment

Residual = Hit Position - Track Position
Using WASA tracking (MFT1,2 +MDC+PSB)

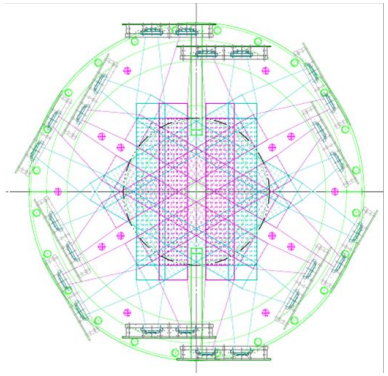
MFT residual before alignment



MFT residual after alignment



Mini Fibers (MFT12)



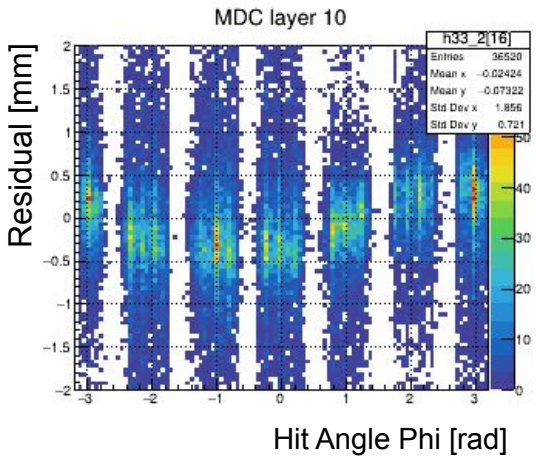
6x2 layers

For each layer was corrected:
- Position XYZ
- Layer angle (1-2º)
- Individual fiber offset

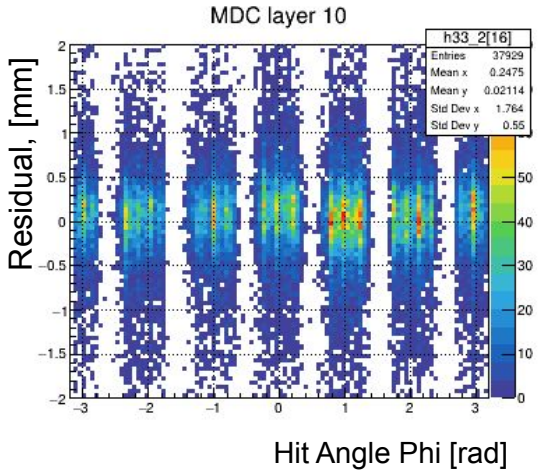
Mini Drift Chamber (MDC) alignment

Residual = Hit Position - Track Position
Using WASA tracking (MFT1,2 +MDC+PSB)

MDC Before alignment

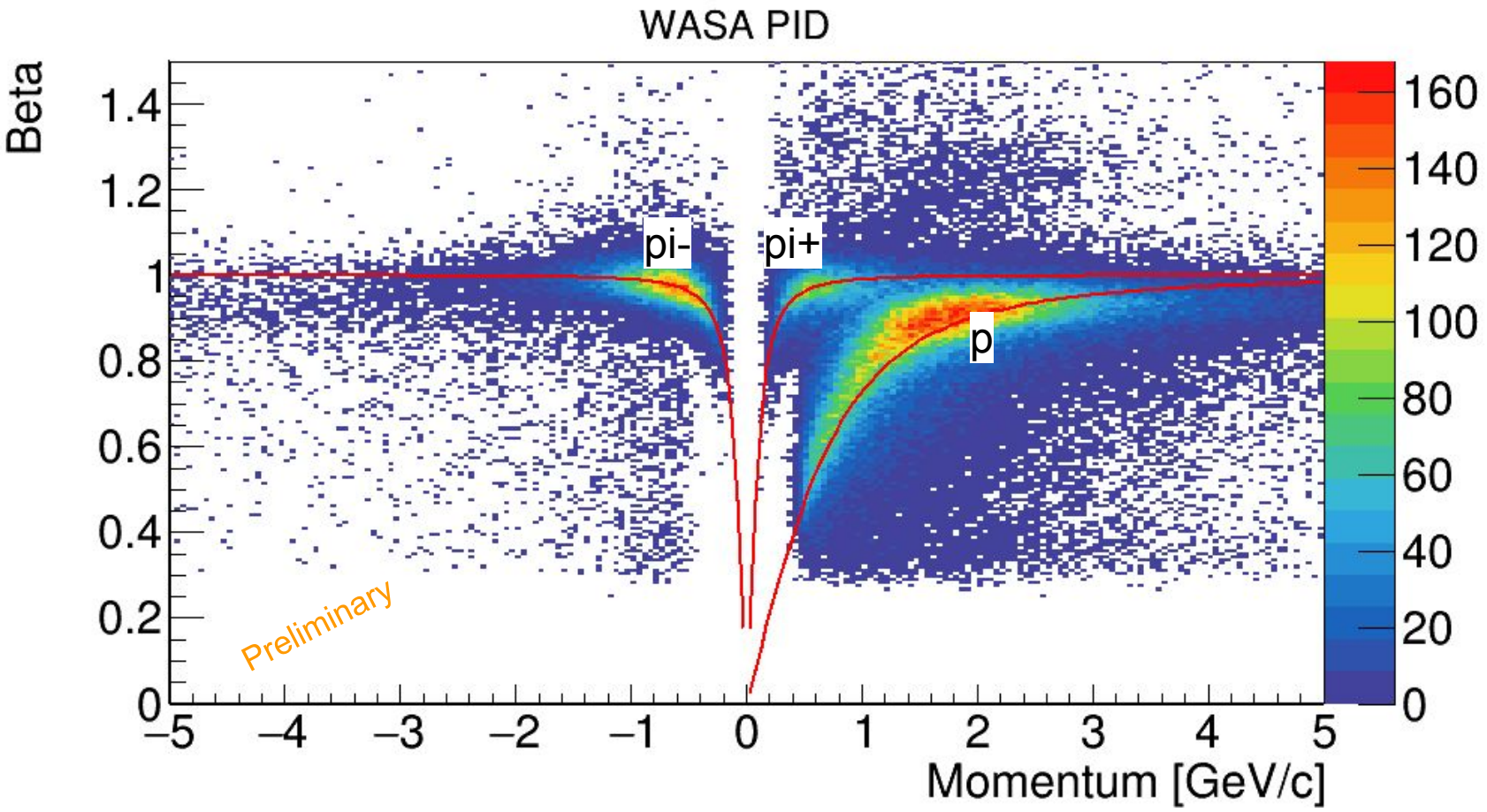


MDC After alignment

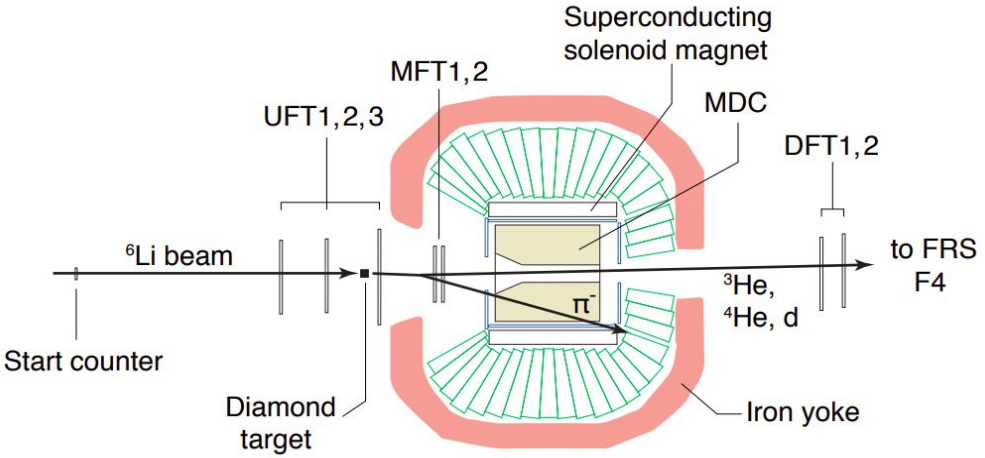


MDC
- Position XYZ
- Rotation XYZ

Particle Identification

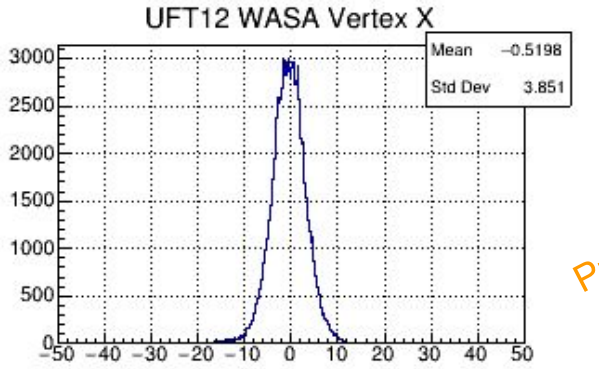


Vertex reconstruction

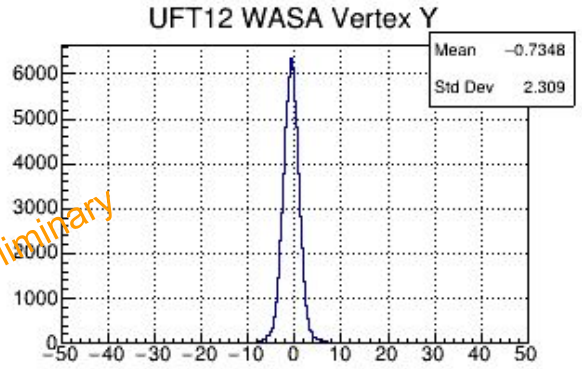


Primary vertex reconstruction using

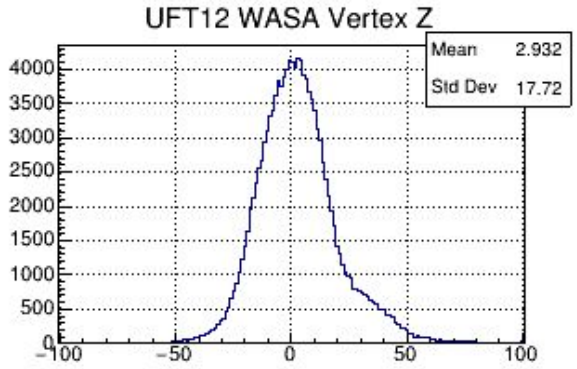
- WASA tracking (MFT1,2+MDC+PSB)
- UFT1,2 tracking



Vertex Position [mm]



Vertex Position [mm]



Vertex Position [mm]

Summary and future plan

Currently data analysis is actively ongoing:

- Detectors calibrations and alignment successfully done
- PiD plot
- Primary vertex reconstruction

Future plan to get:

- Invariant mass distribution
- Secondary vertex reconstruction
- Hypertriton lifetime
- Existence of nnΛ

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Ryohei Sekiya
Yiming Gao
Takehiko Saito
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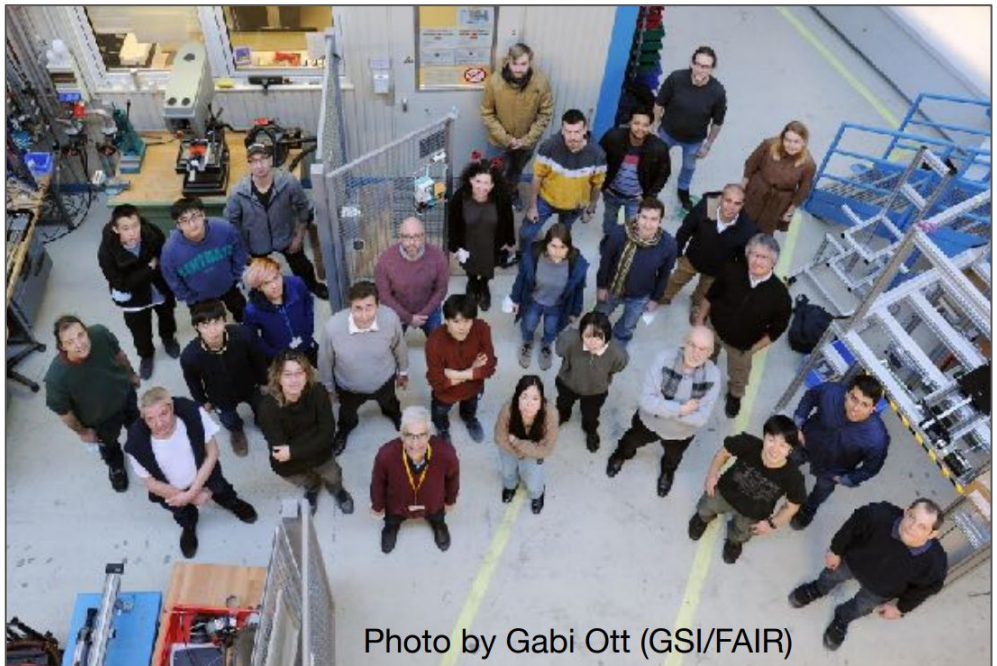

Photo by Gabi Ott (GSI/FAIR)