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K_L Flux Monitor

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Outlook

- Why?
 - K_L flux monitoring
- How?
 - Basic principles
 - FM Design
- Detectors
- Physics

K_l flux monitor location

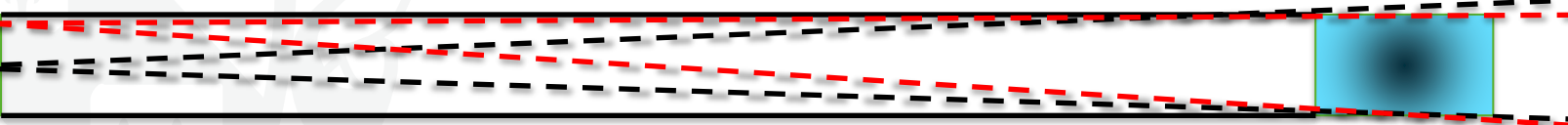


Be target

LH2/LD2 target

24 m

Flux Monitor

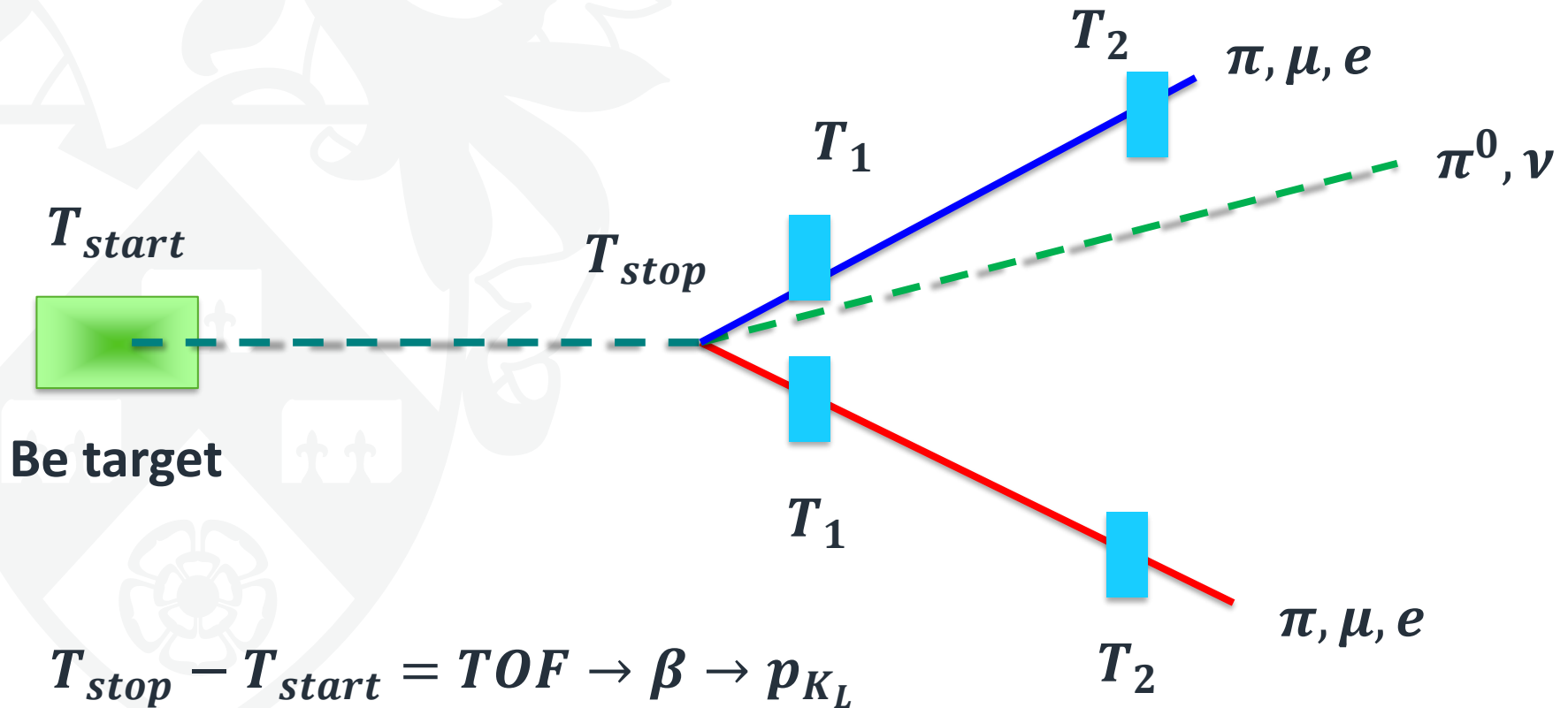


K_L decays

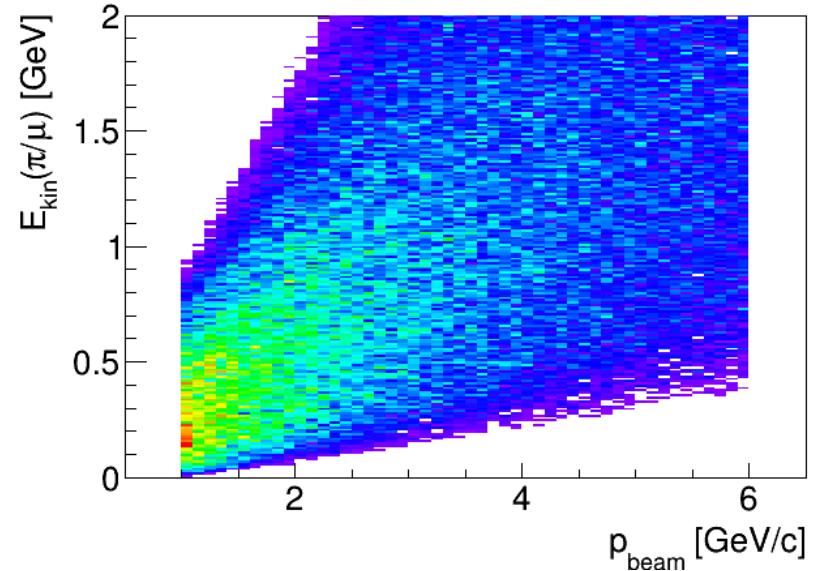
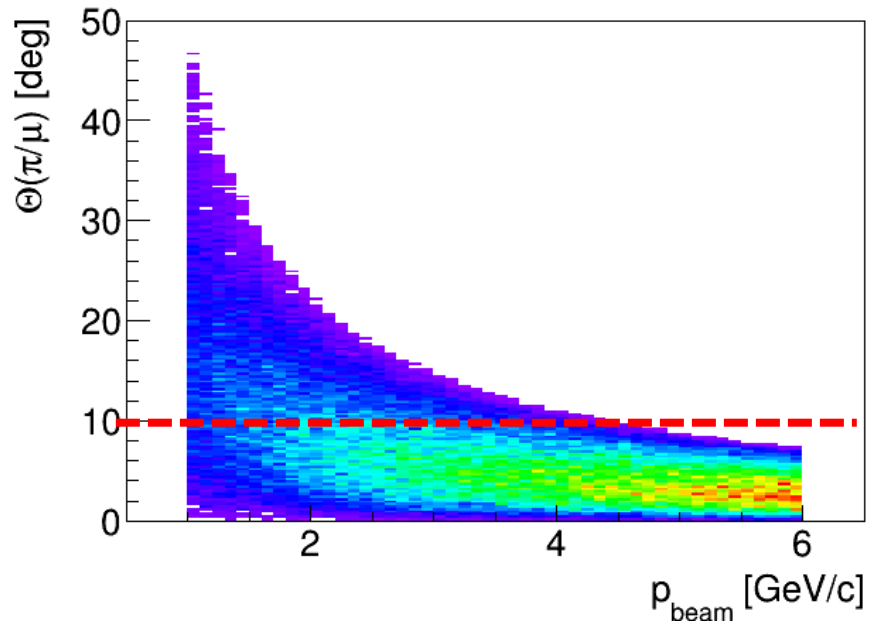
	Br, %
$K_L \rightarrow \pi^\pm e^\mp \nu_\mu$	40.55
$K_L \rightarrow \pi^\pm \mu^\mp \nu_\mu$	27.04
$K_L \rightarrow \pi^+ \pi^- \pi^0$	12.54
$K_L \rightarrow \pi^0 \pi^0 \pi^0$	19.52

- ~ 21% of kaons decays in flight
- Any decay with charged particles can be used

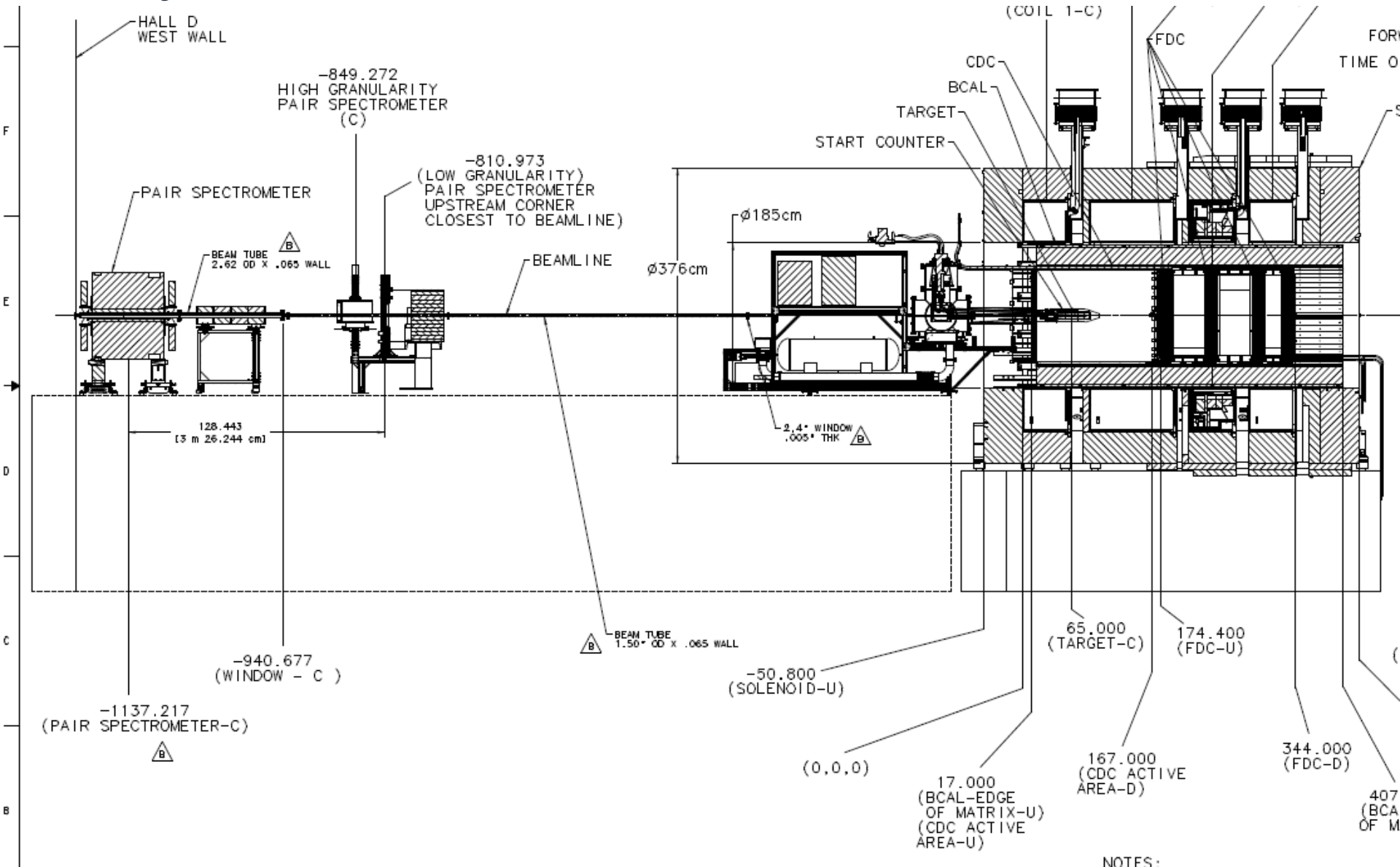
K_L monitoring



$K_l \rightarrow \pi^\pm \mu^\mp \nu_\mu$ reaction kinematics

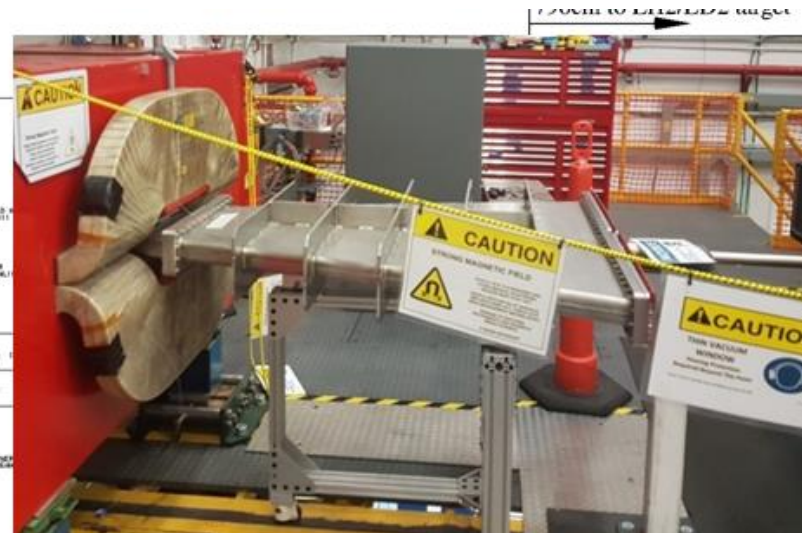
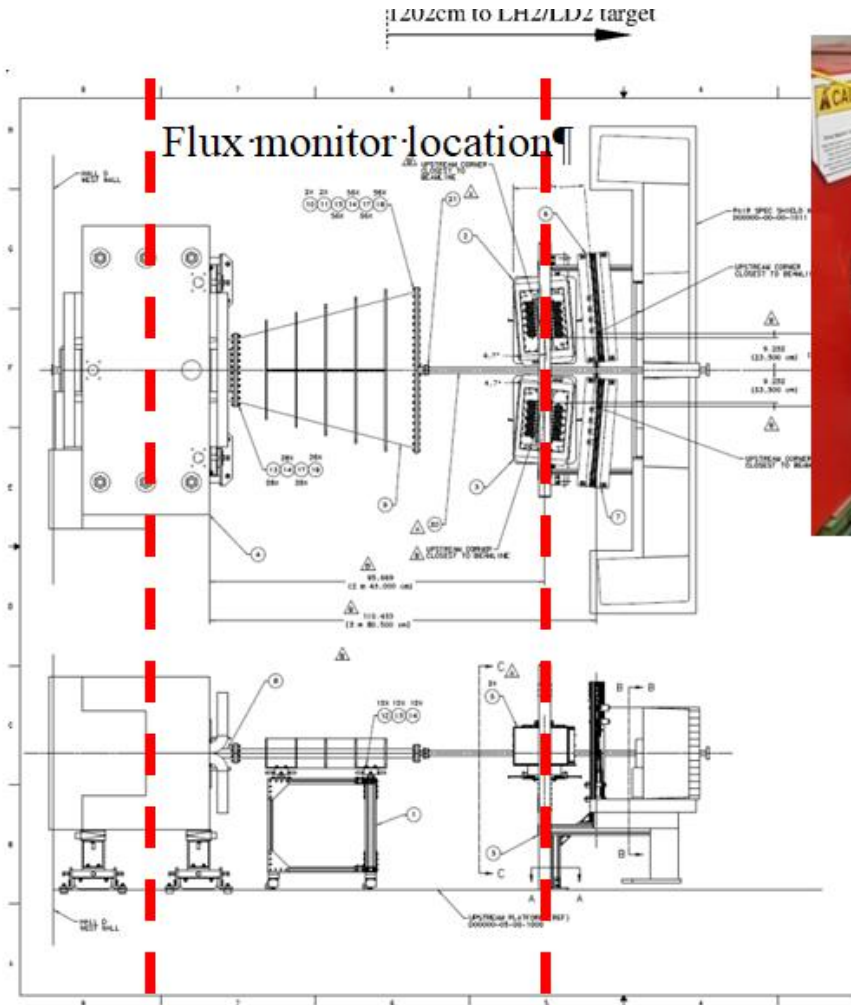


K_L flux monitor location



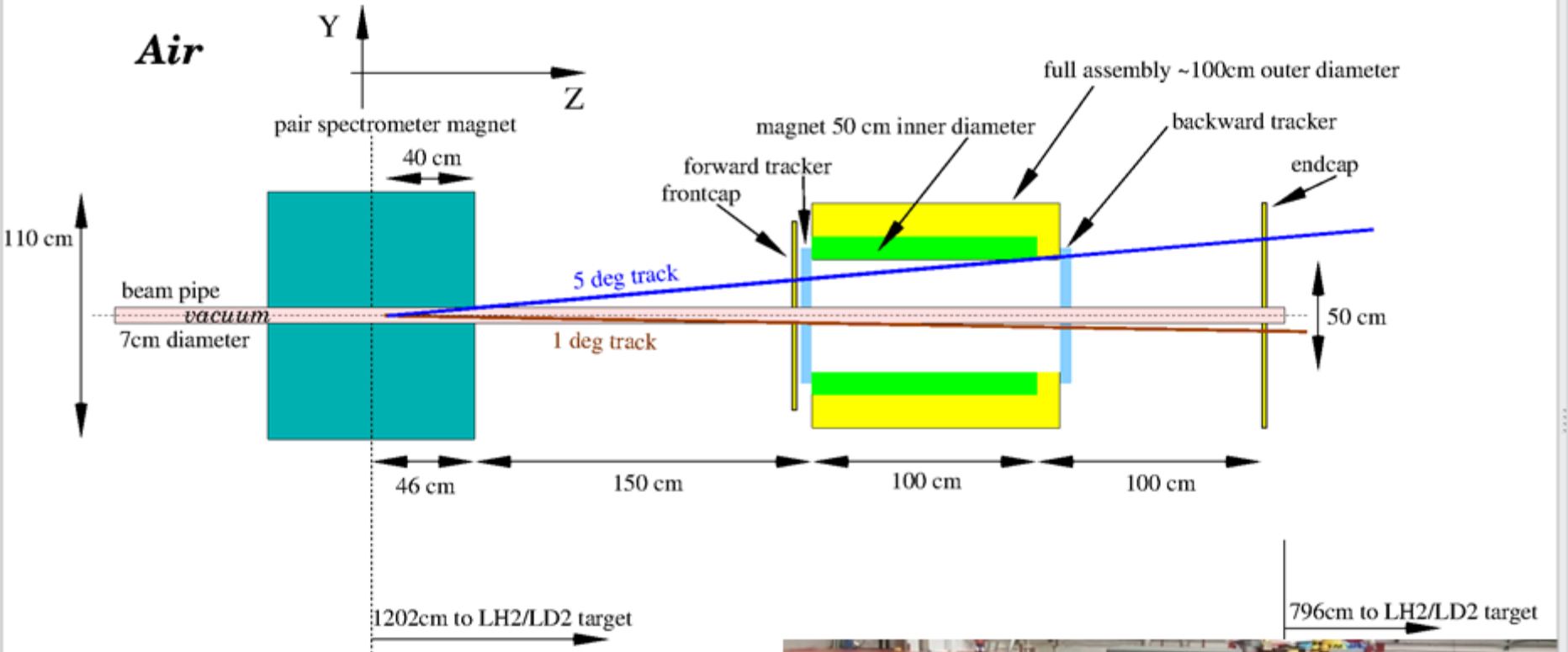
NOTES:

Flux monitor location

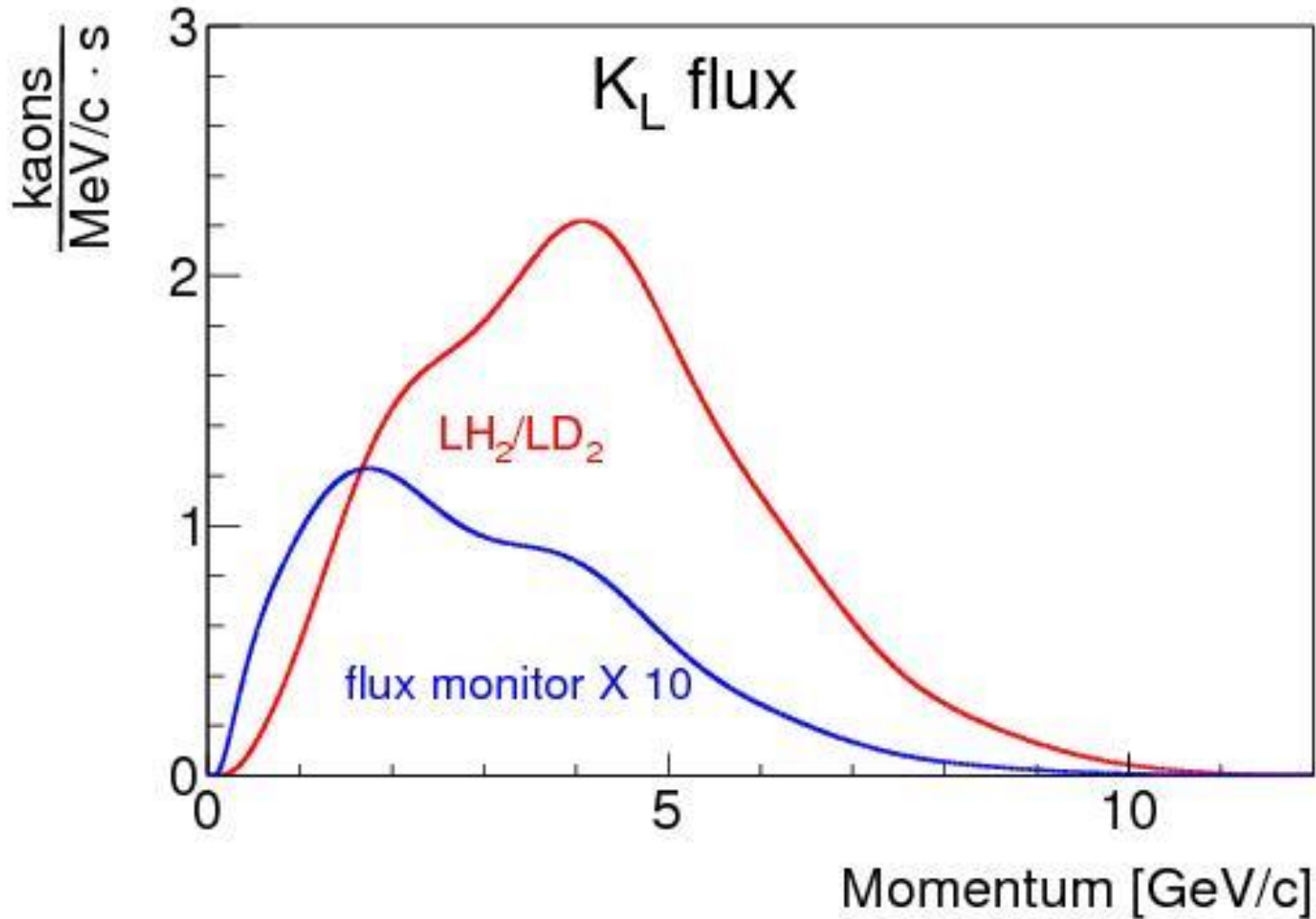


K_1F Monitor

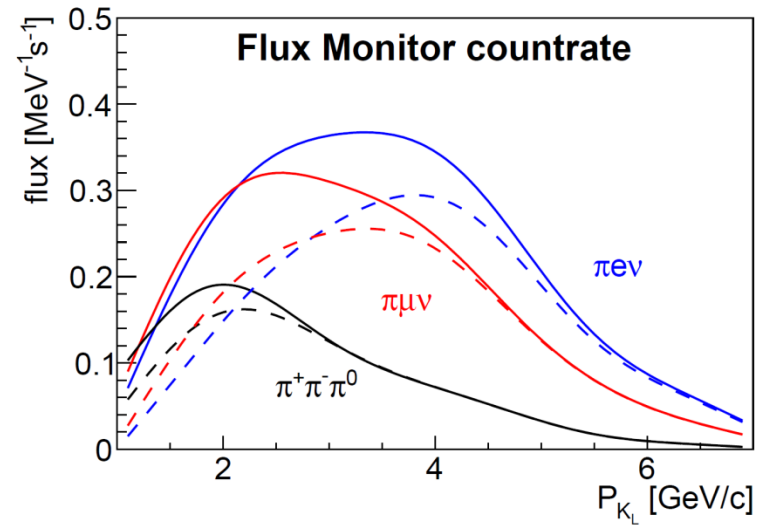
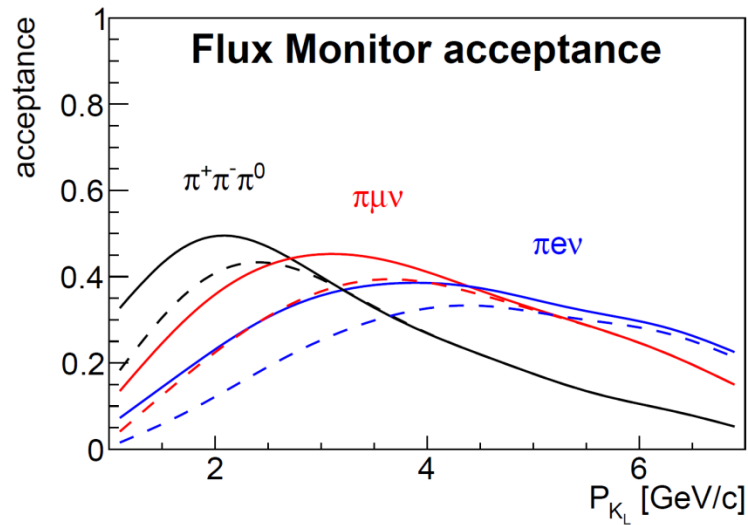
Magnet, 1m long, 50 cm diameter
Flux Monitor



K_L spectrum

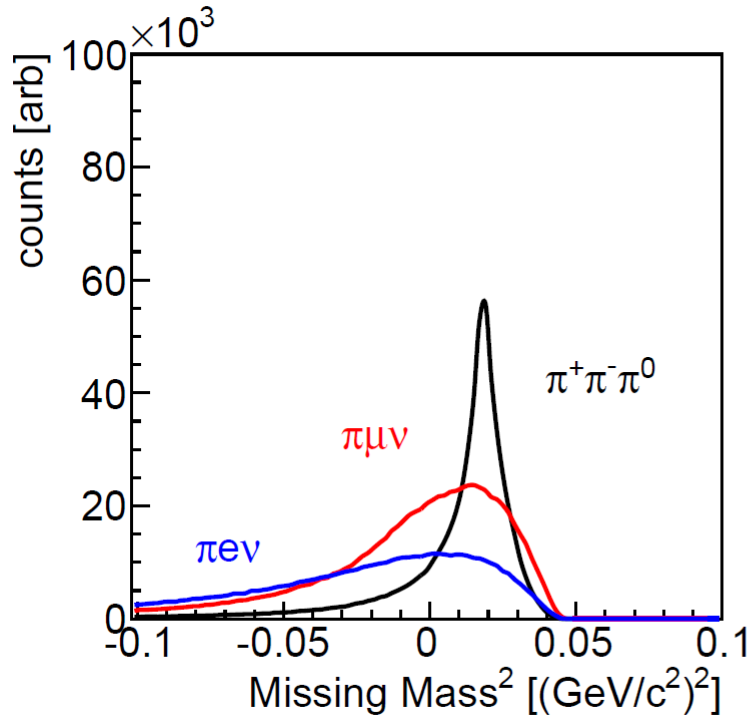


K_L in-flight decay

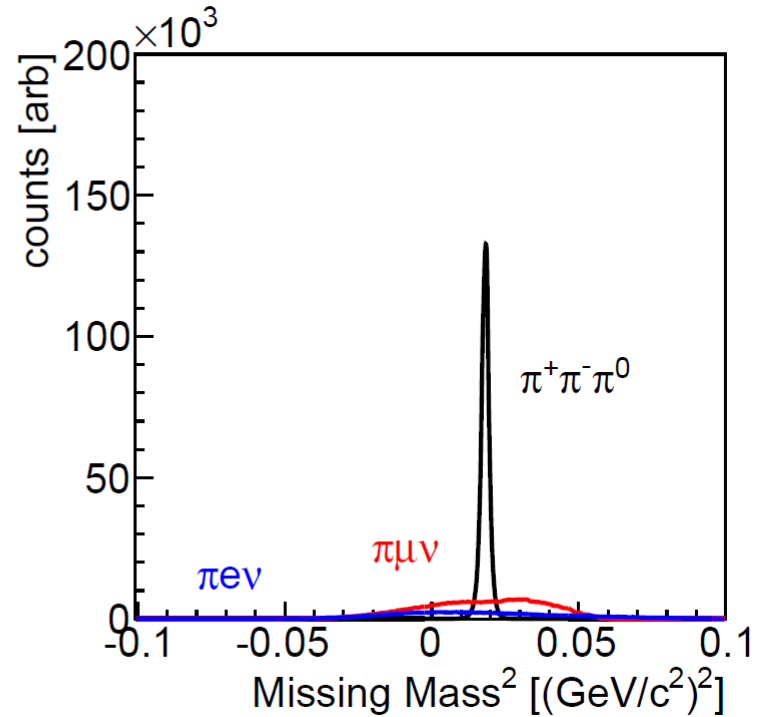


K_L FM resolution

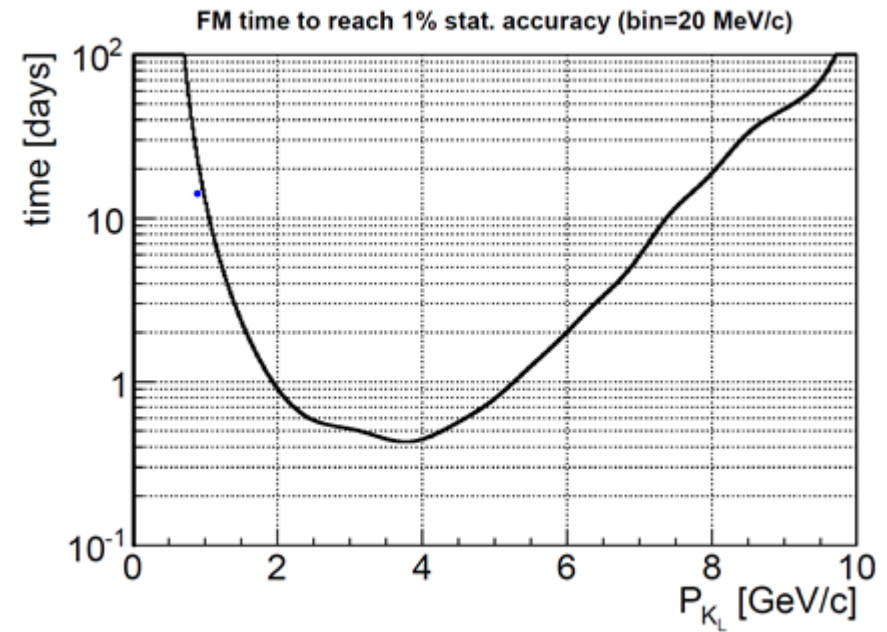
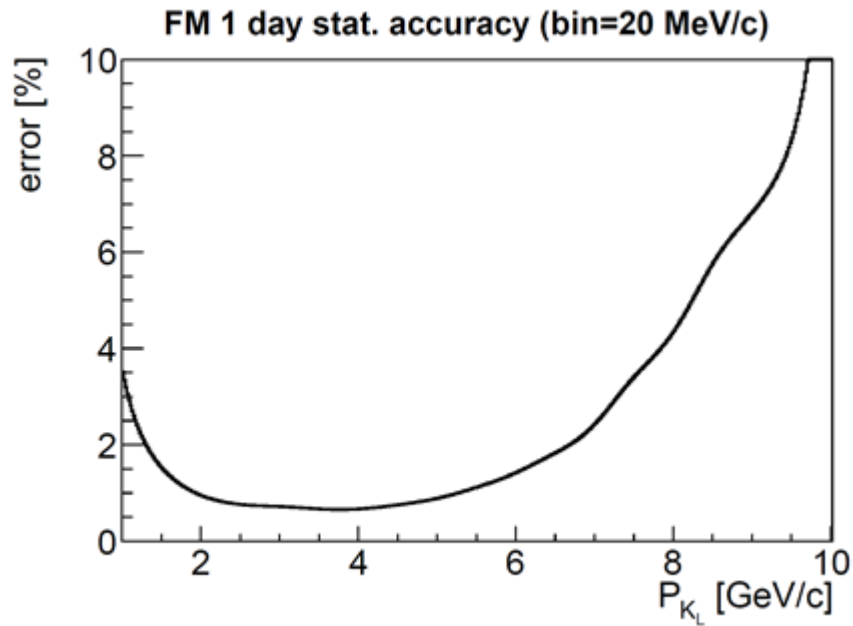
TOF reconstruction



Magnetic reconstruction



Expected stat accuracy



Possible magnet



Siemens Magnetom 1.5T used MRI

Table 4: Magnet specification

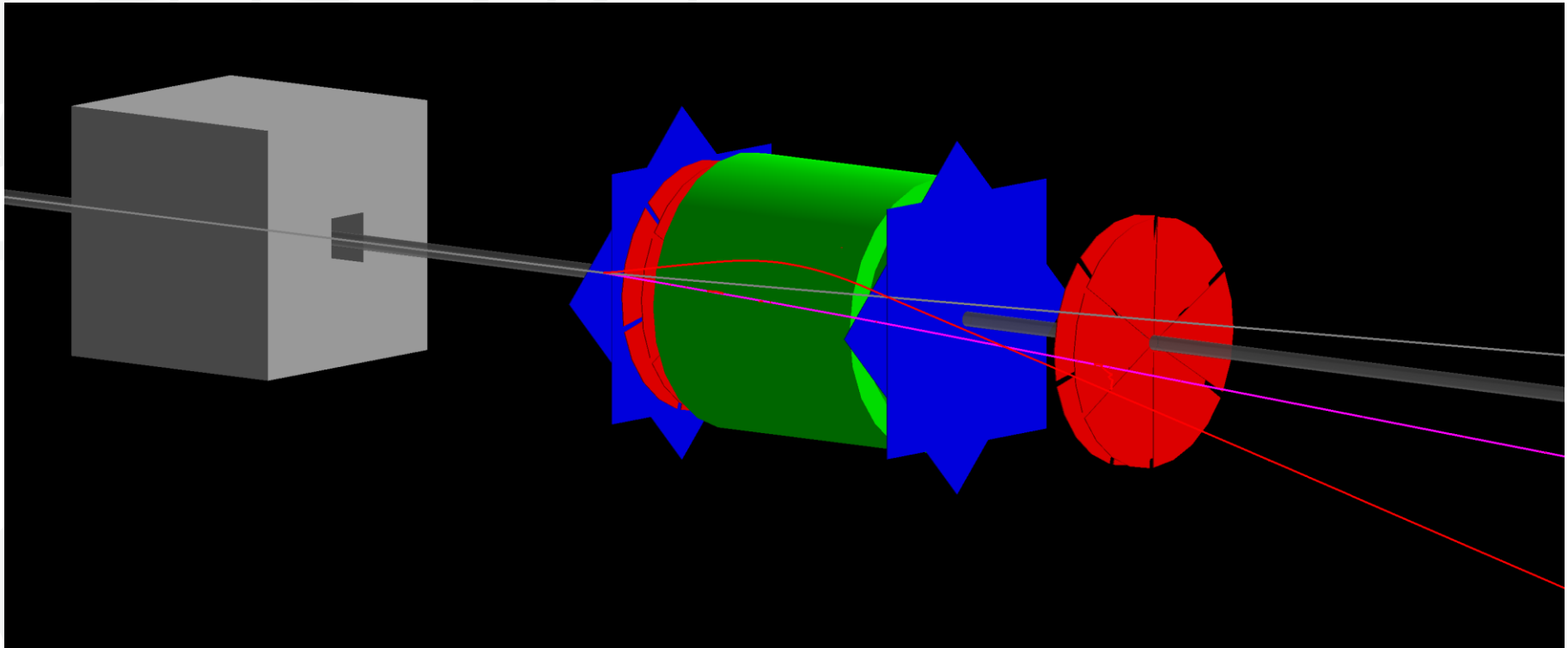
Parameter	Siemens
RF frequency MHz	63.6
Shielding	Passive and active
Homogeneity (VRMS) 40 cm DSV ppm	0.2 (typically)
Field stability ppm/hr	< 0.1
Number of measurement planes	24
Number of measurement points	20
Cooling system	Liquid helium only
Boil-off rate l/hr	0
Helium refill	10 years maximum (approximately)

Table 7: Installation details

Overall scanner dimensions	Siemens
Mass: magnet only tonnes	3.55 ± 8 (including helium)
Mass: assembly tonnes	5.5
Depth with covers (z) cm	160
Width with covers (x) cm	230
Height with covers (y) cm	230

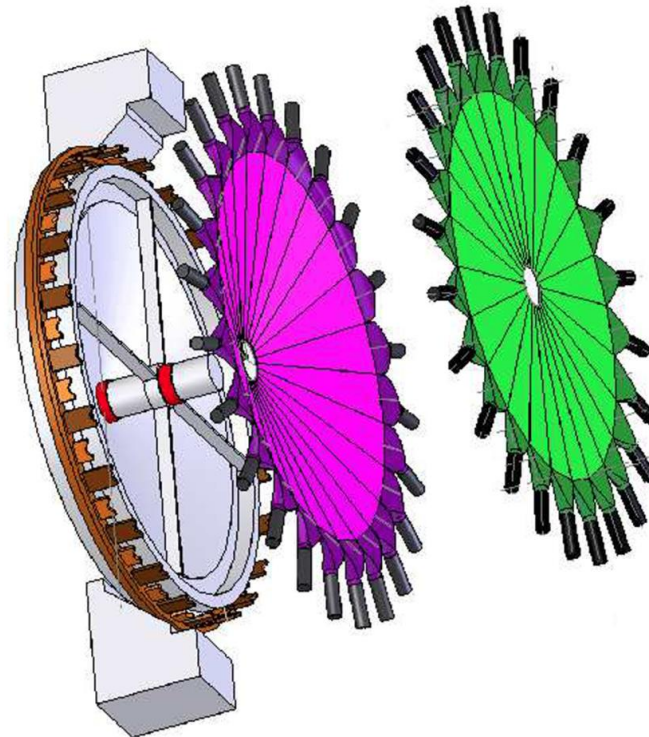
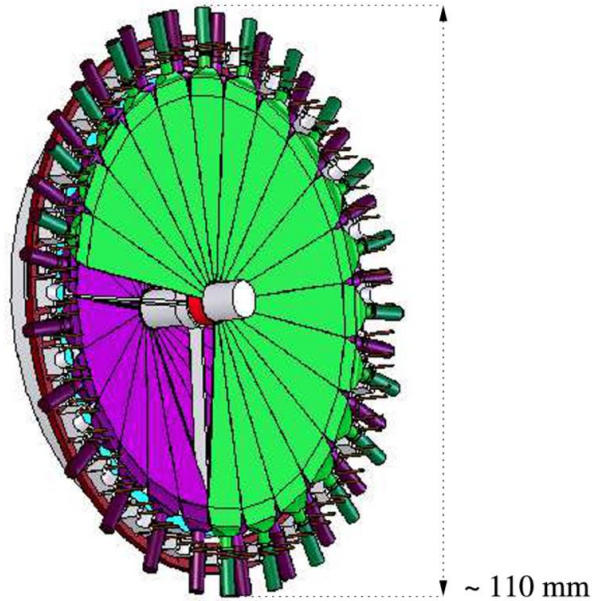
~70kEuro+delivery

Simulations

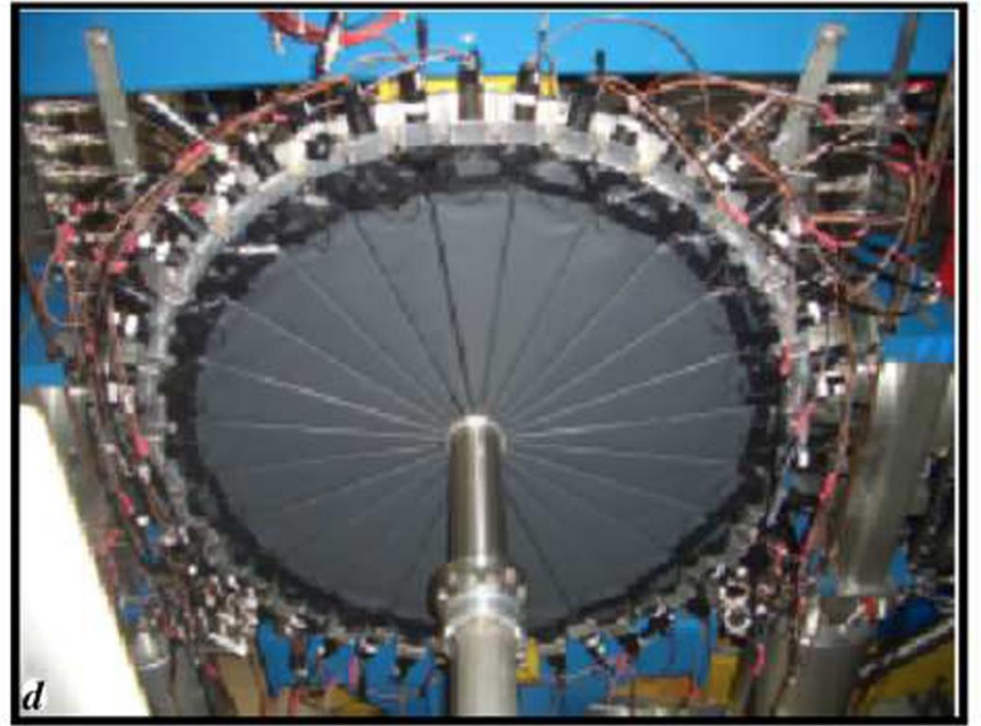
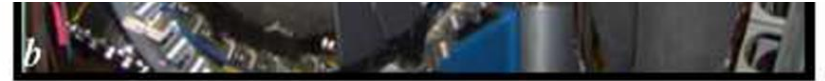
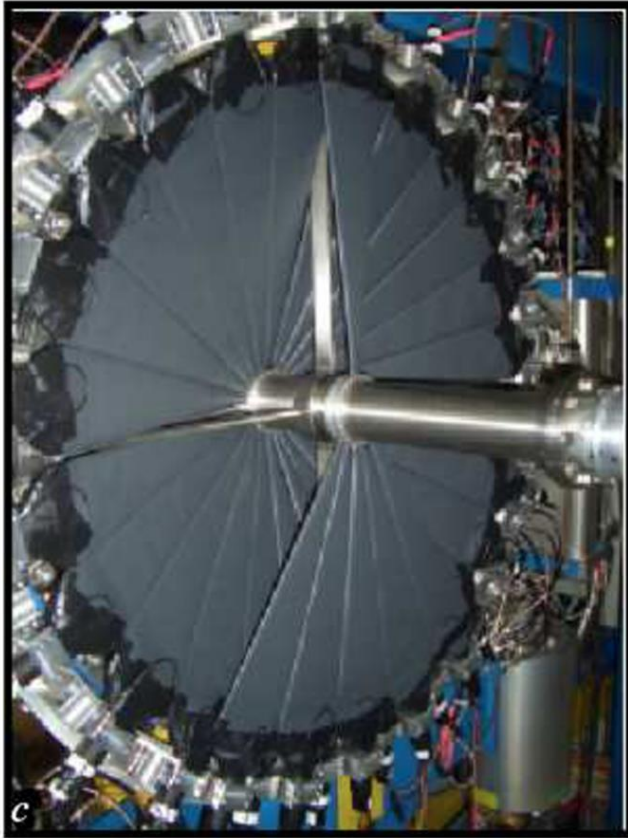


Less background with dipole "ON"

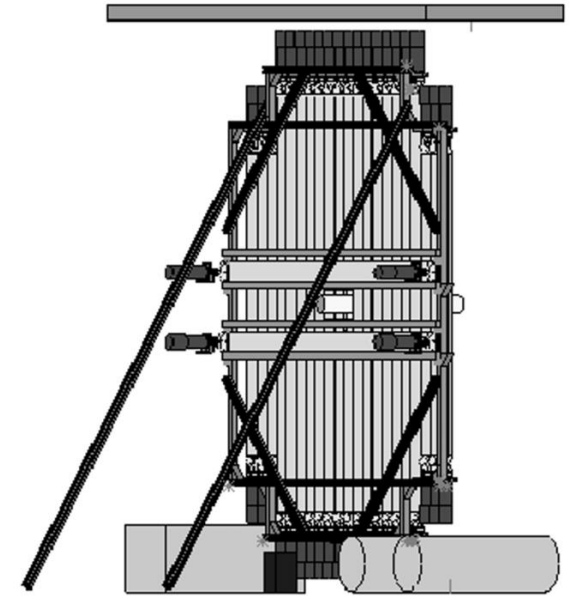
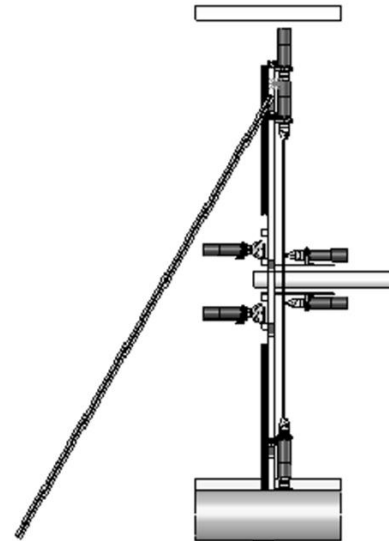
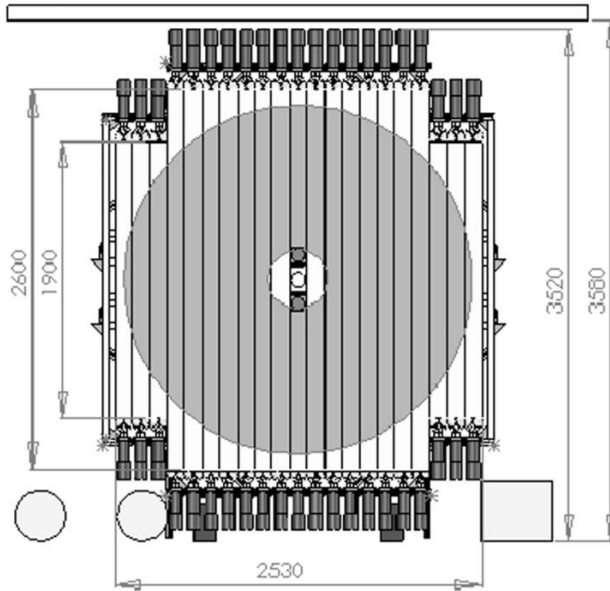
Wasa detectors



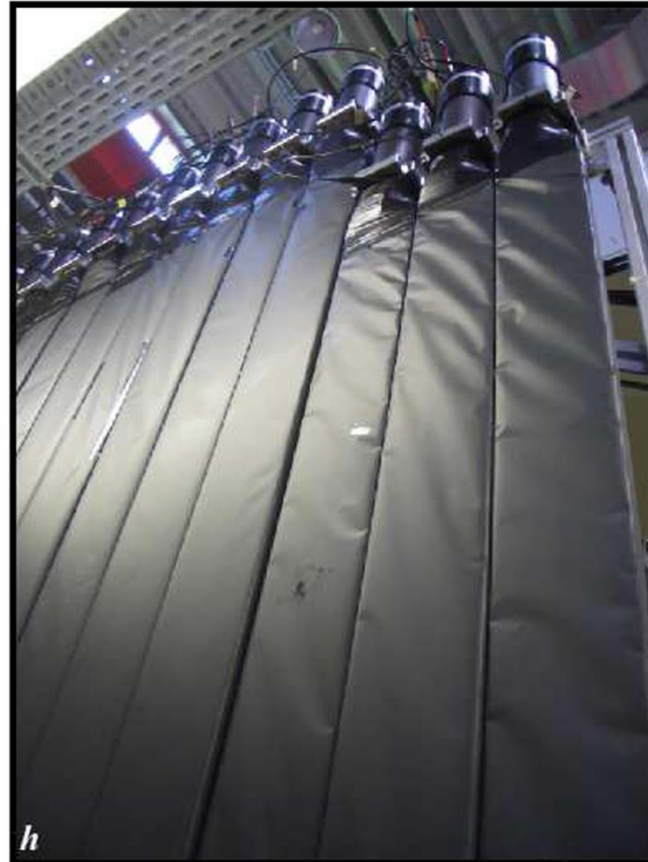
Wasa detectors



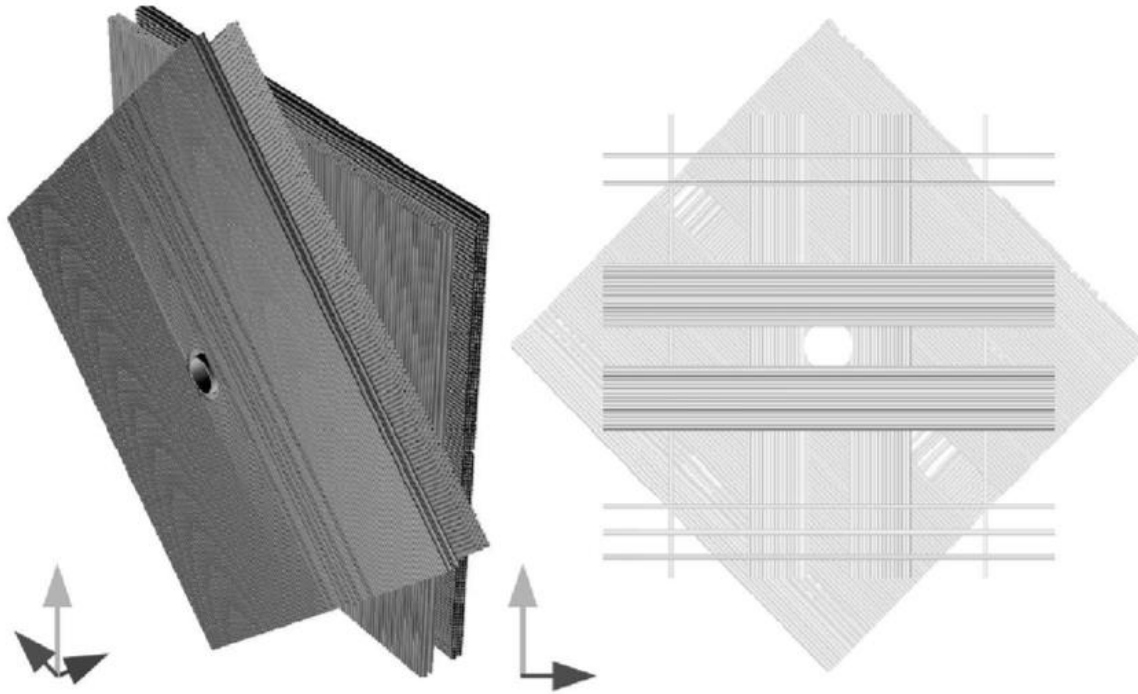
Wasa detectors



Wasa detectors



Wasa detectors



(b) *Forward Proportional Chamber FPC*

To do

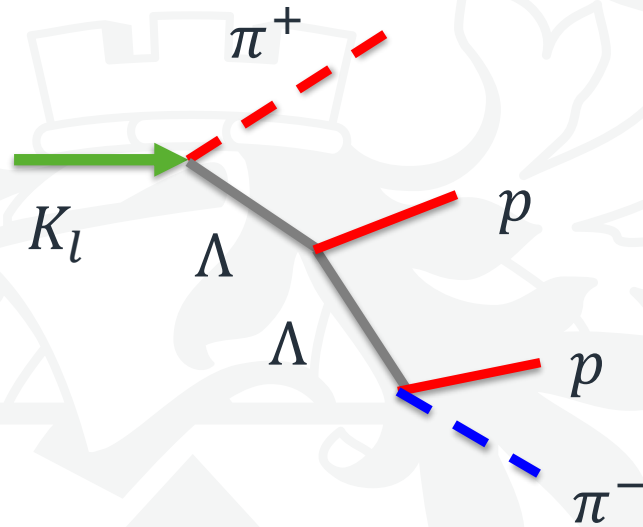
- Simulations of “other” designs
- Construction of ToF prototypes (achievable ToF resolution)



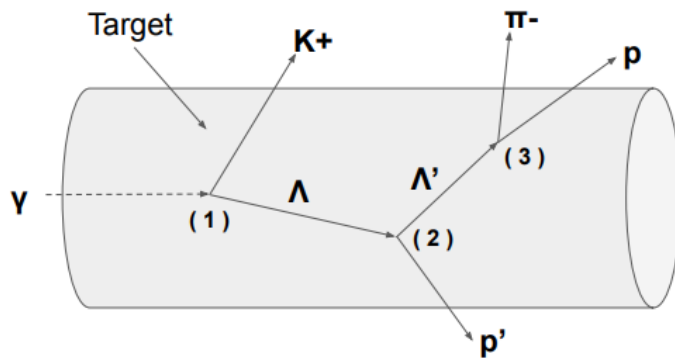
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Physics

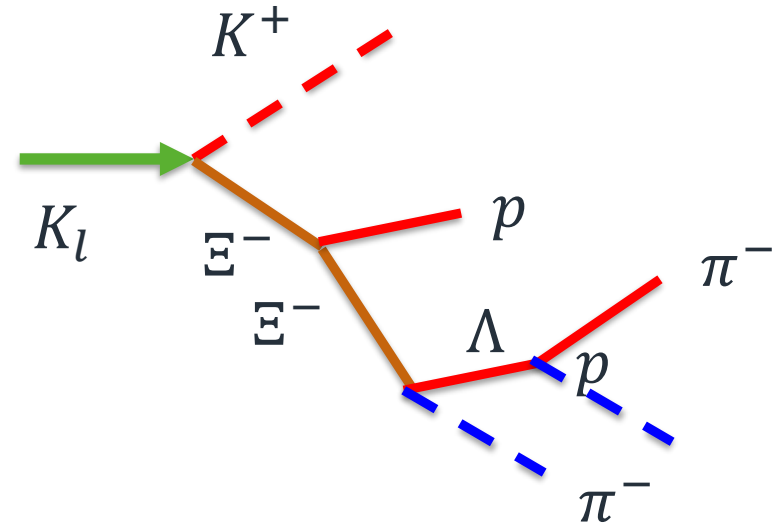
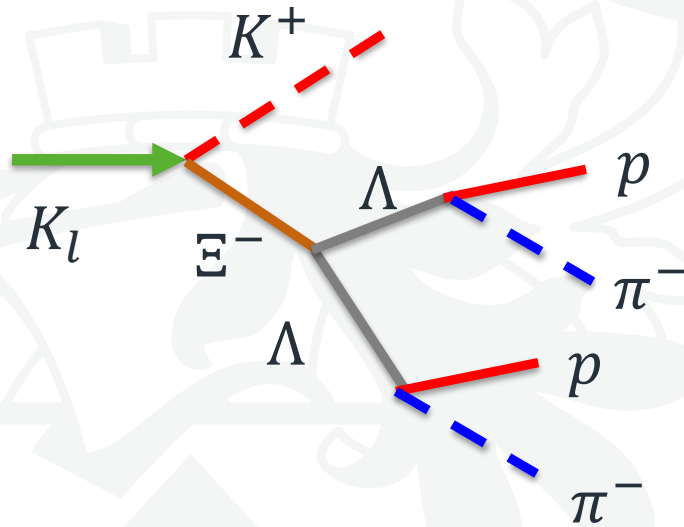
Hyperon scattering at KLF



- > 500k Λ /day produced
- ~50k Λp scattering events measured in 100 days



Hyperon scattering at KLF



- Over 3M cascades produced in 100 days
- Few thousands scattering events **measured** in 100 days

Conclusion



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