K_L Flux Monitor

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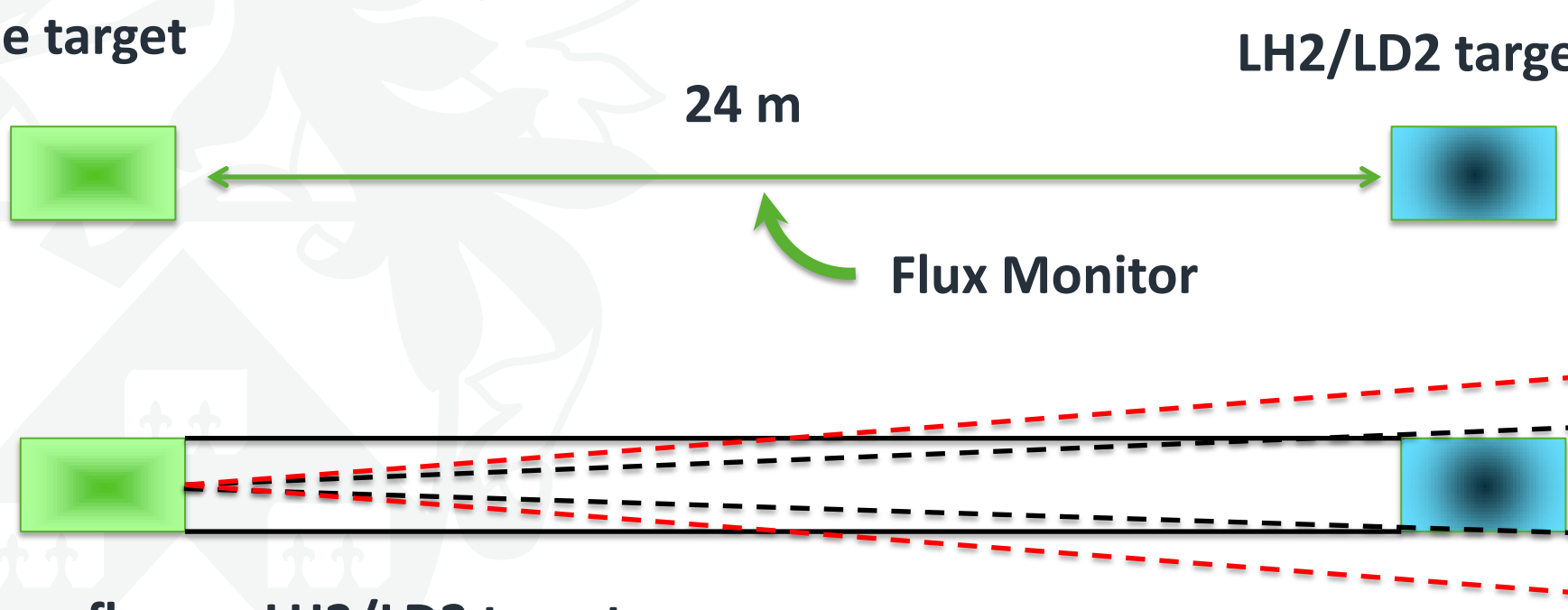
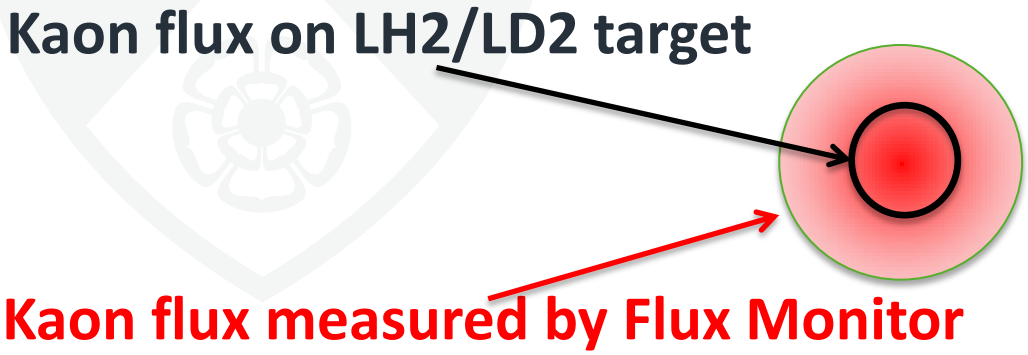
Outlook

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

K_l flux monitor location



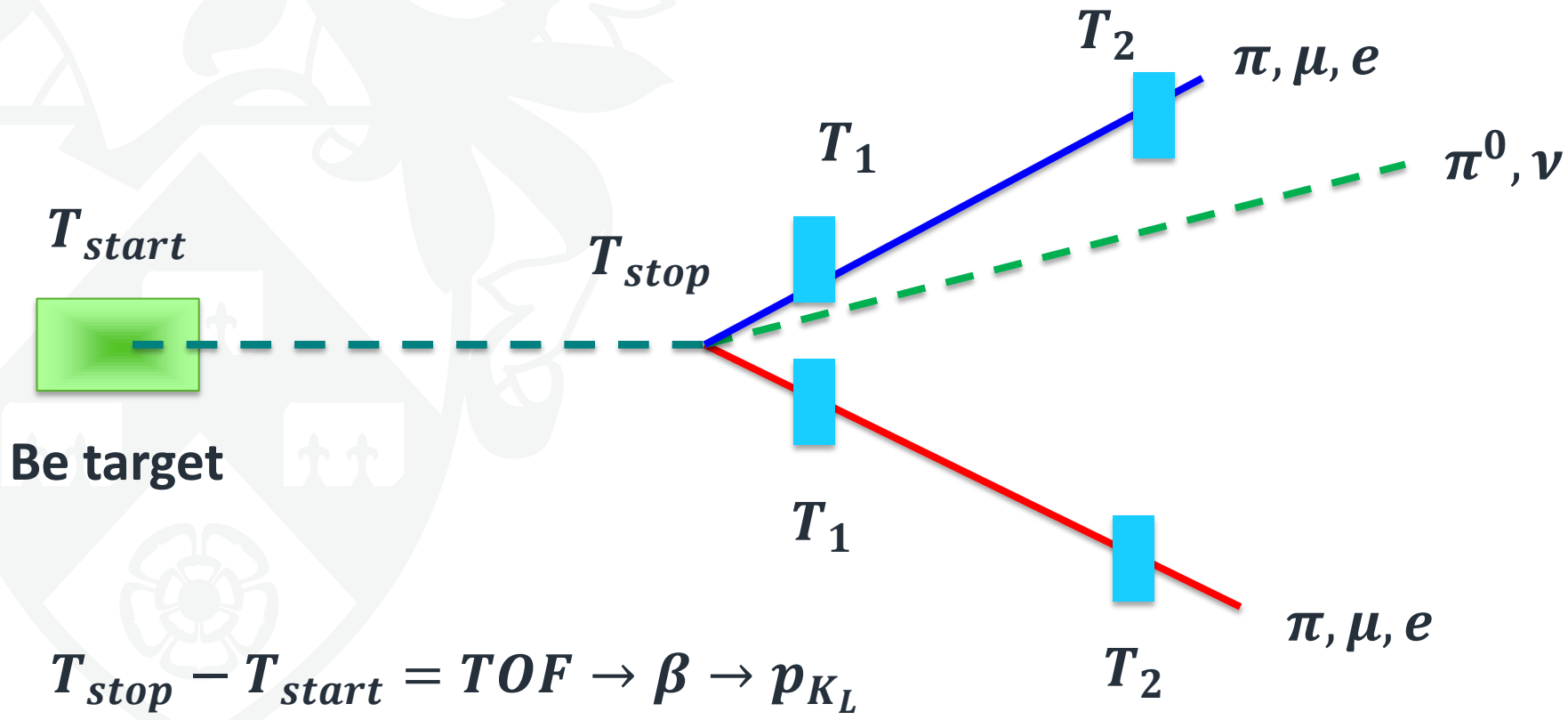


K_L decays

	Br, %
$K_l \to \pi^{\pm} e^{\mp} \nu_\mu$	40.55
$K_l \to \pi^{\pm} \mu^{\mp} \nu_\mu$	27.04
$K_l \to \pi^{+} \pi^{-} \pi^{0}$	12.54
$K_l \to \pi^{0} \pi^{0} \pi^{0}$	19.52

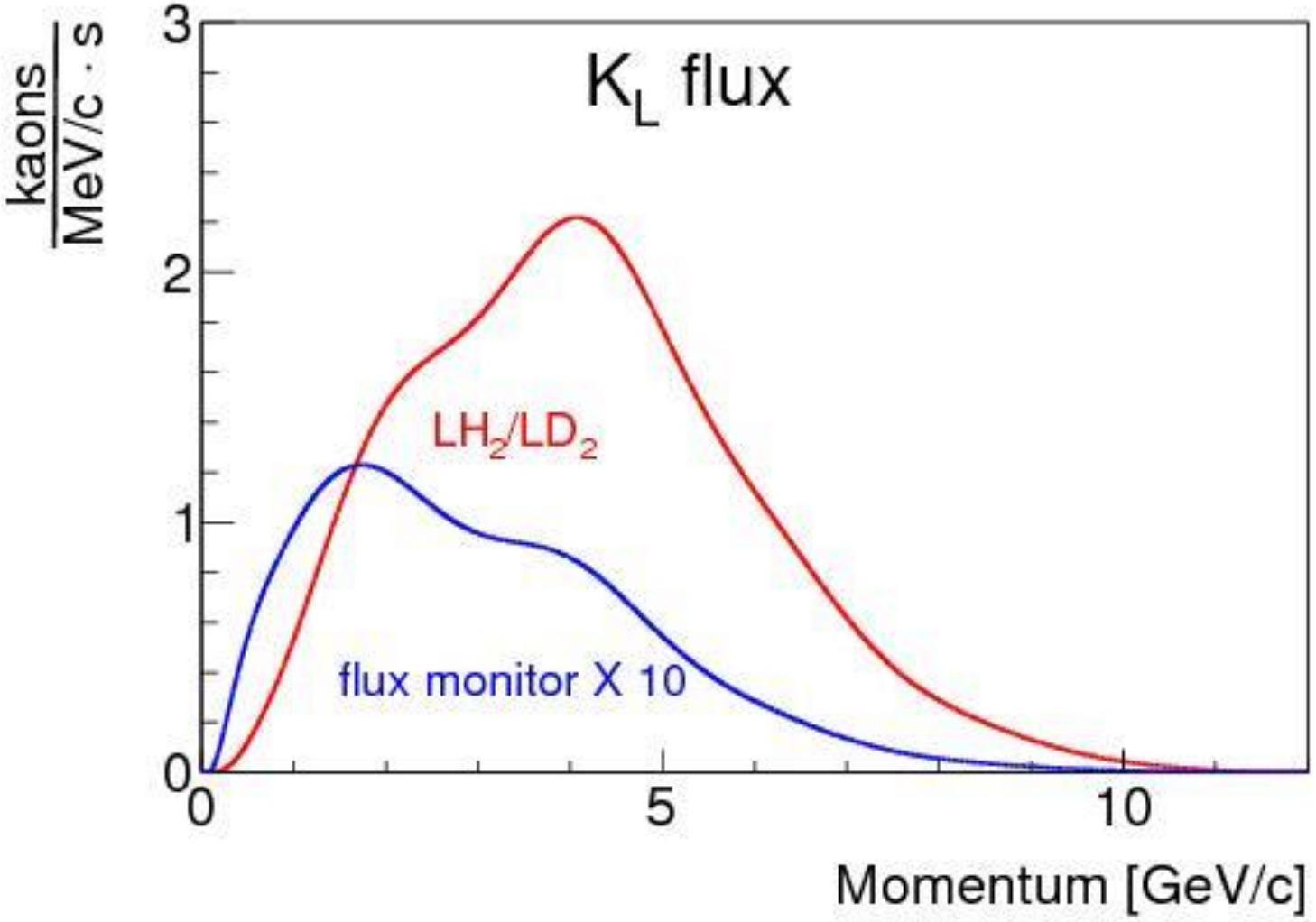
- **~ 21% of kaons decays in flight**
- **Any decay with charged particles can be used**

K_L monitoring



$$T_{stop} - T_{start} = TOF \rightarrow \beta \rightarrow p_{K_L}$$

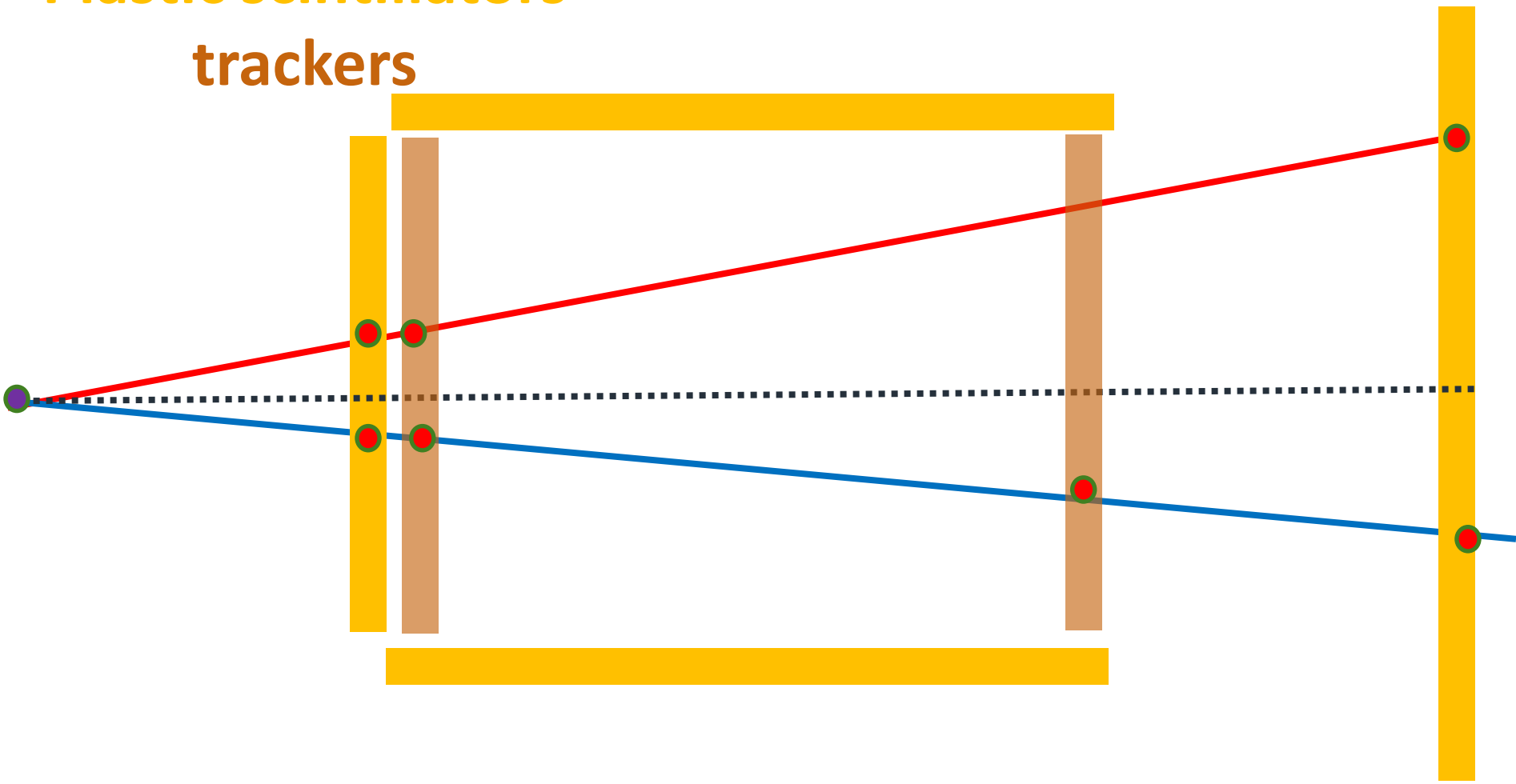
K_L spectrum

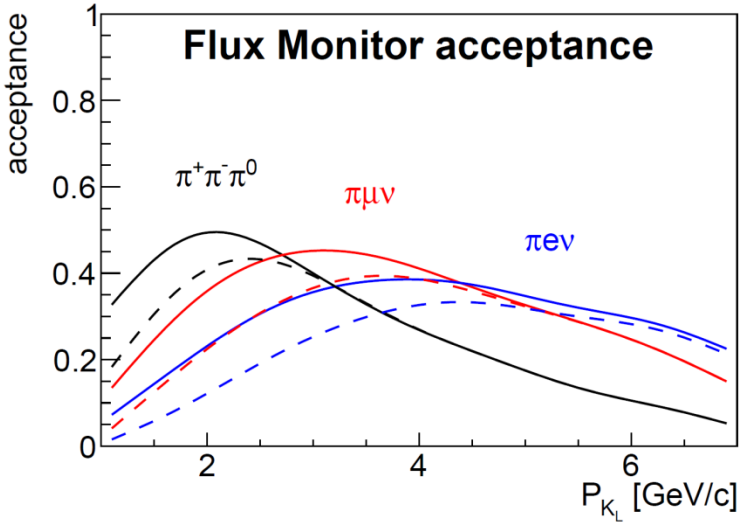

K_L flux
kaons / MeV/c · s
LH2/LD2
flux monitor X 10
0
1
2
3
0
5
10
Momentum [GeV/c]

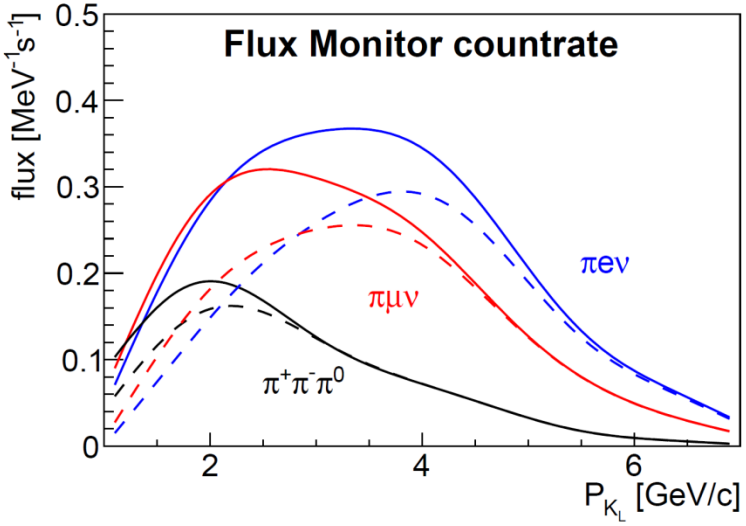
$K_l F$ Monitor

Plastic scintillators

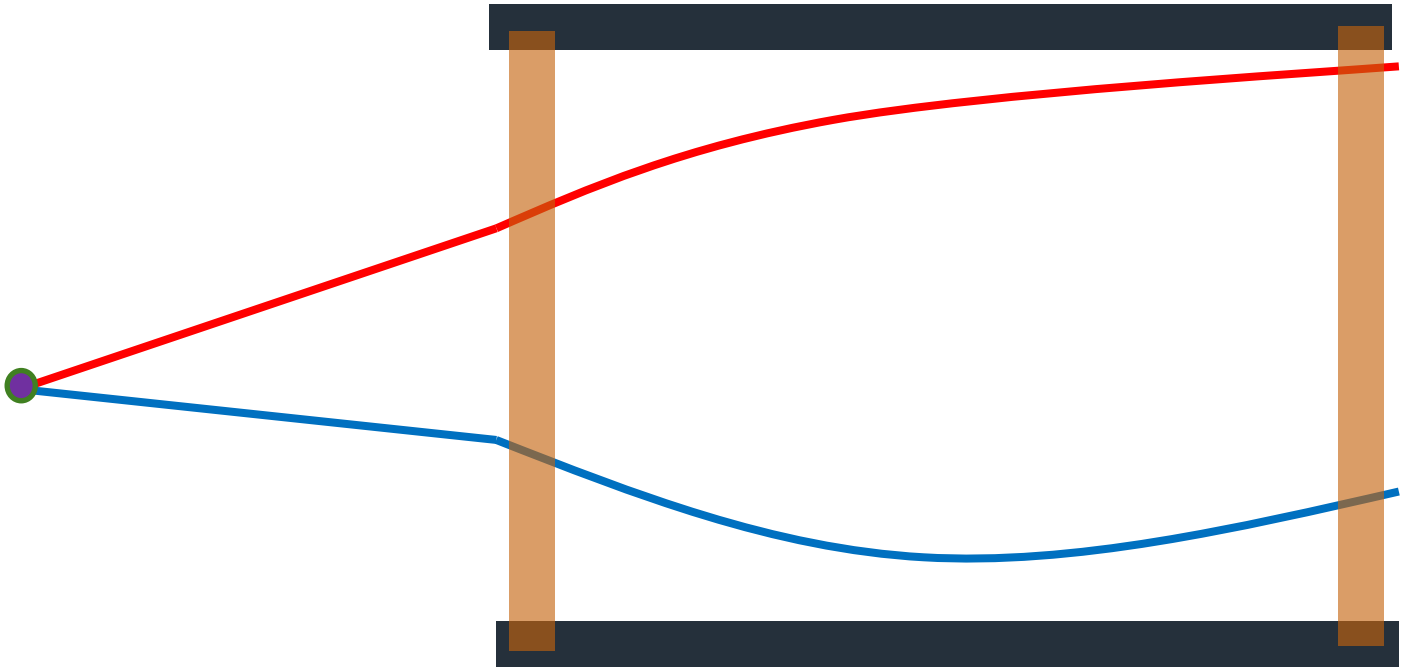
trackers




Flux Monitor acceptance
acceptance
$\pi^+\pi^-\pi^0$
$\pi\mu\nu$
$\pi e\nu$
P_{K_L} [GeV/c]


Flux Monitor countrate
flux [MeV^{-1}s^{-1}]
$\pi e\nu$
$\pi\mu\nu$
$\pi^+\pi^-\pi^0$
P_{K_L} [GeV/c]

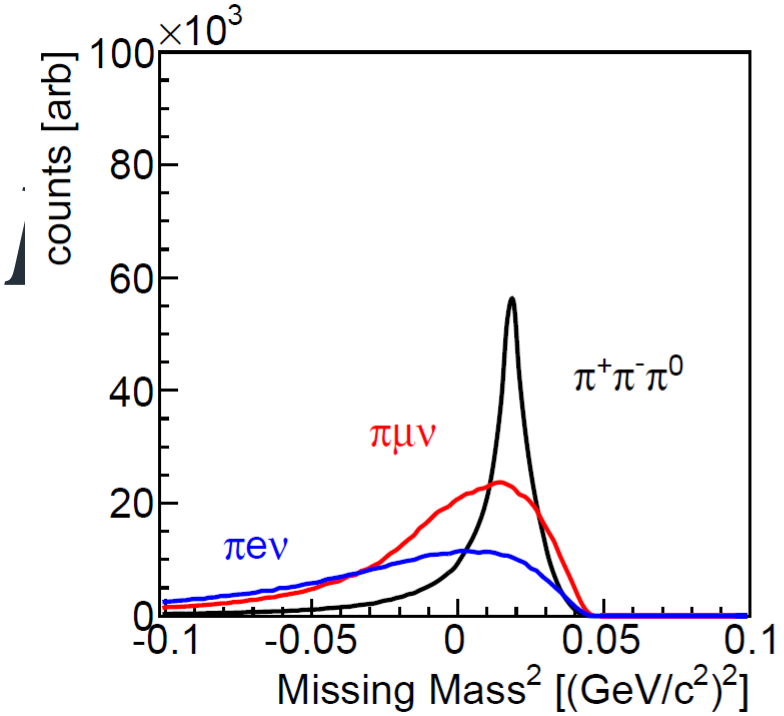
Phi displacement



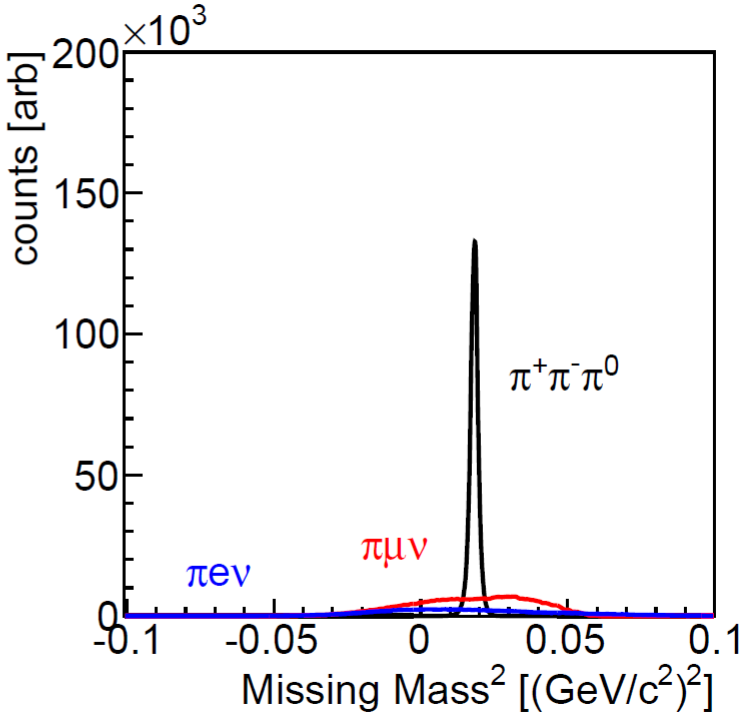
$$\phi' = 0.5\frac{l \cdot z \cdot 0.3 \cdot B}{p \cdot \cos(\Theta)};\ l \sim 1m, |z| = 1; B = 1;$$

$$\phi'[rad] = \frac{0.15}{p[GeV/c] \cdot \cos(\Theta)}$$

TOF reconstruction

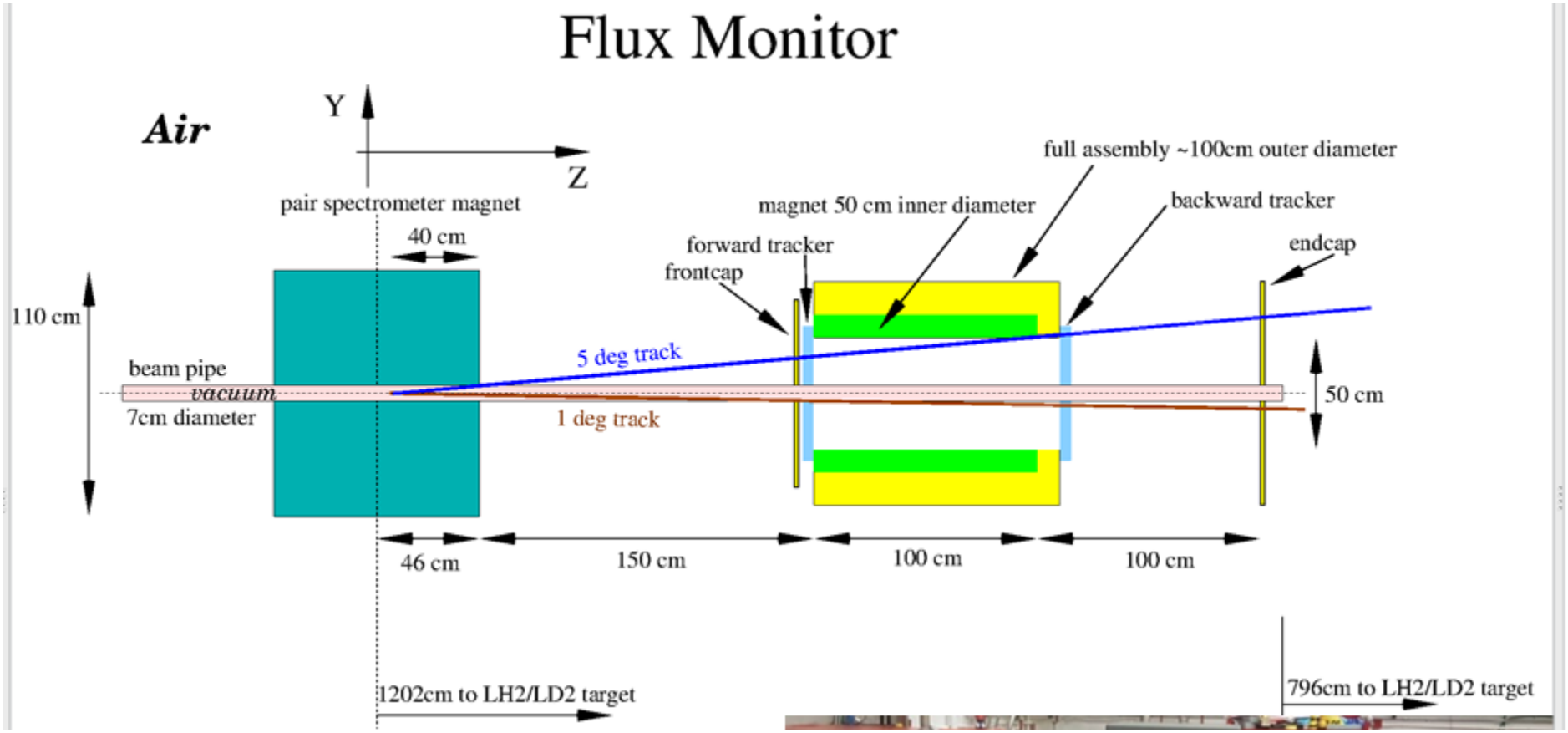


Magnetic reconstruction

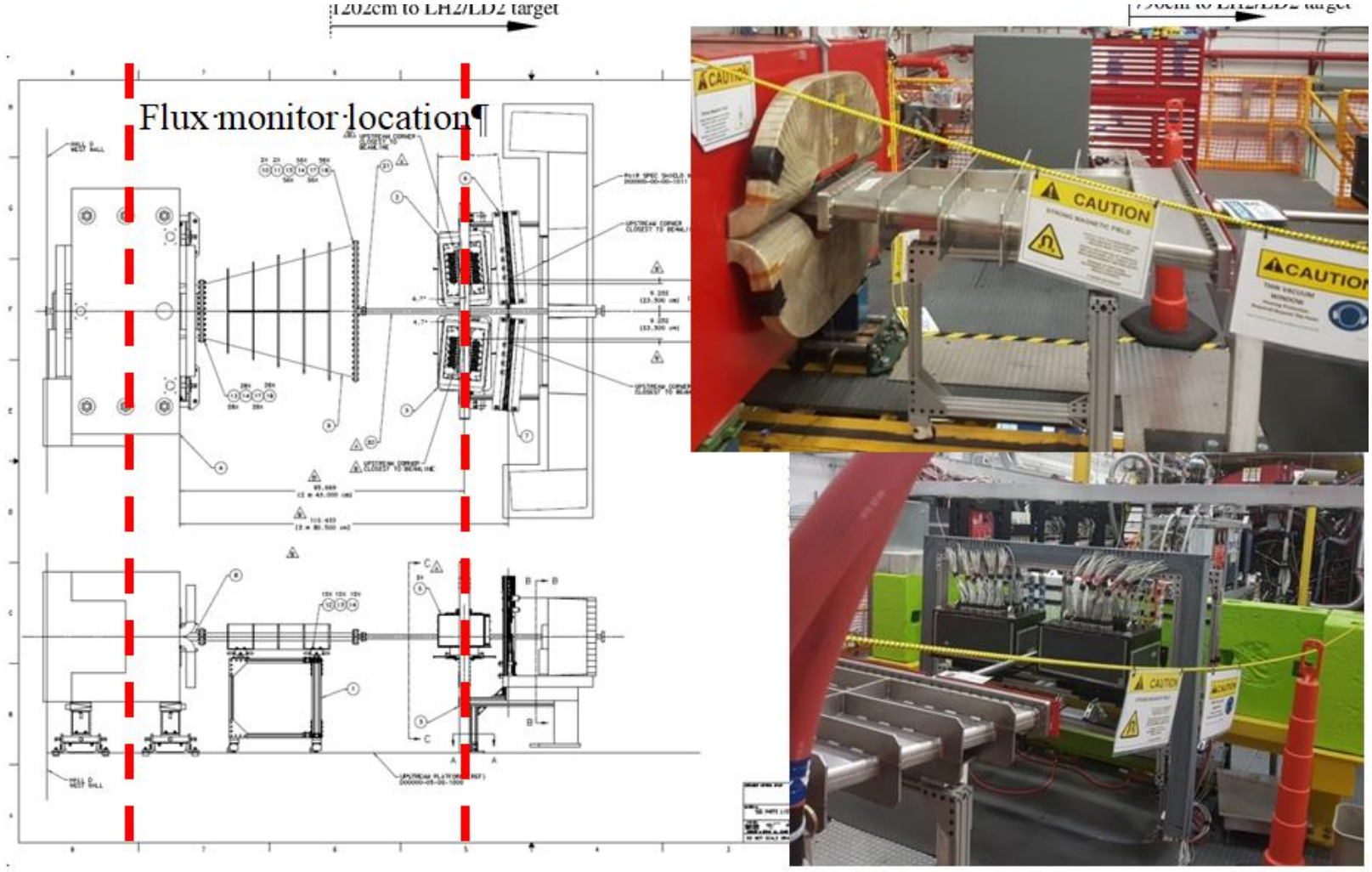


$K_l F$ Monitor

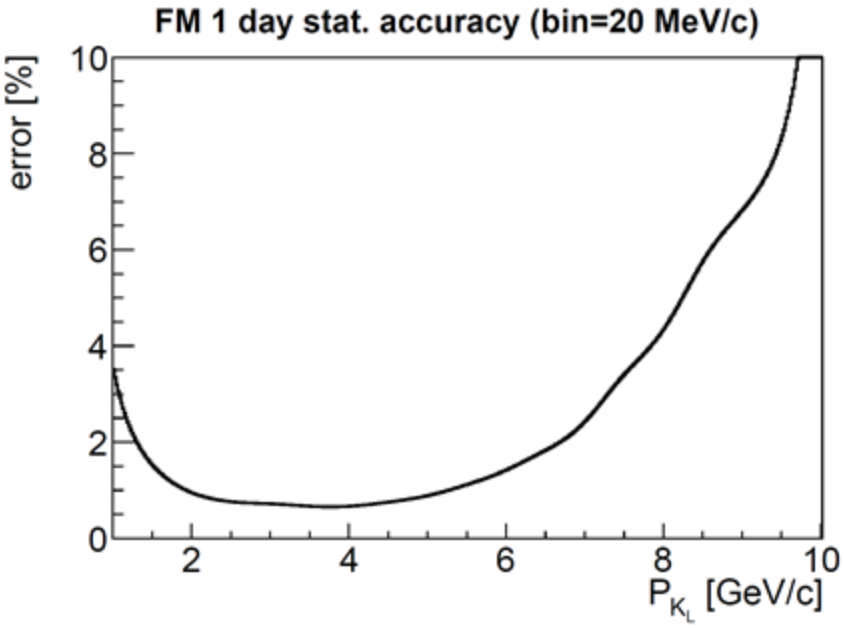
Magnet, 1m long, 50 cm diameter

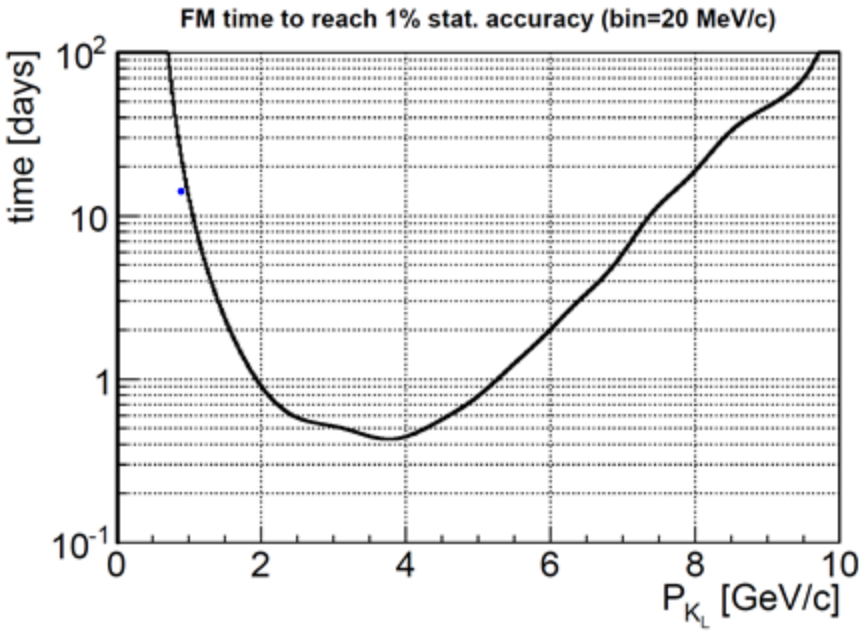


Flux monitor location

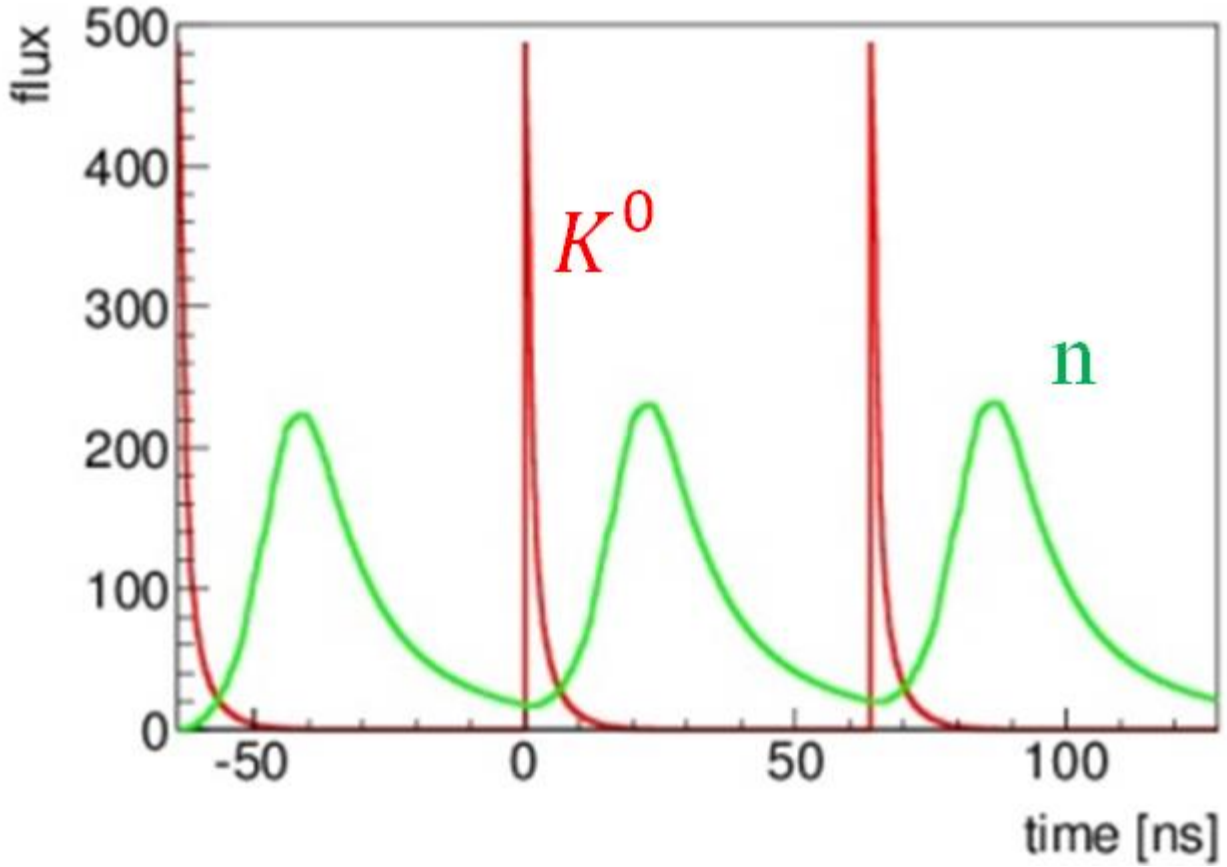


Expected stat accuracy





Time structure of K_L flux



Possible magnet

CERN ISOLDE ISS

Retired MRI scanner - $1

Conclusion

- Kaon flux can be measured
- Preliminary design is done
- Further optimisations under way