K_L Flux Monitor - Progress and Plans

KLF Collaboration Meeting, JLab

Image: University of York/Alex Holland



Stuart Fegan University of York February 12th, 2020





- K_L flux monitoring
 - Overview
 - K_L decays
 - TOF/Phi Displacement
- K_L flux monitor design
 - Location
 - Expected Performance
- Conclusions and Outlook



• Full flux of diverging K_L beam can be measured by careful choice of flux monitor location





Flux at target can be inferred when no information lost in beampipe



	UNIVERSITY	KLF Concept	KLF Design	Conclusions and Outlook
	of York	K_L Decays		

Decay	BR (%)
$K_L ightarrow \pi^\pm e^\mp u_e$	40.55
$K_L o \pi^{\pm} \mu^{\mp} \nu_{\mu}$	27.04
$K_L ightarrow \pi^+ \pi^- \pi^0$	12.54
$K_L ightarrow \pi^0 \pi^0 \pi^0$	19.52

- Roughtly 21% of Kaons decay in flight
- Any decay with charged particles can be used























$$\begin{split} \phi' &= 0.5 \frac{l \cdot z \cdot 0.3 \cdot B}{p \cdot cos(\Theta)}; \text{ I} \sim 1 \text{ m}; \text{ } |z| = 1; \text{ B} = 1 \\ \phi'[\textit{rad}] &= \frac{0.15}{p[\textit{GeV}/c] \cdot cos(\Theta)} \end{split}$$







■ Magnet, 1 m long, 50 cm diameter





Design Overview

KLF Concept

KLF Design

Conclusions and Outlook



- Trackers from PANDA prototypes (currently at HADES)
- TOF prototypes to be built in York (funding requested from STFC)



 The ISOLDE Experiment at CERN used a retired MRI scanner magnet, acquired for a nominal sum (\$1)















- Different timing structure of K_L and neutrons
- Neutron background in K_L beam is small



- Kaon flux can be monitored
- Preliminary design is being optimised
- Funding requested for prototyping (STFC, UK)