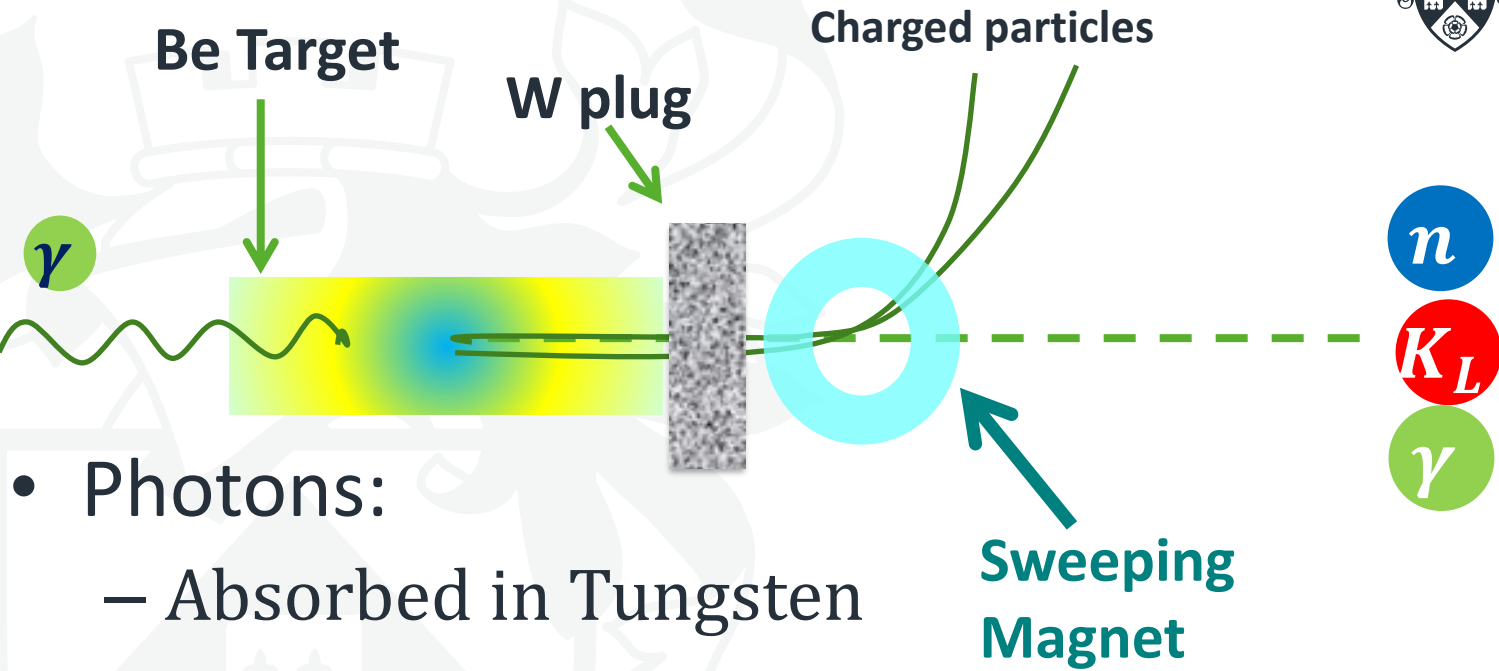




Backgrounds at KLF

Mikhail Bashkanov

Possible Backgrounds



- Photons:
 - Absorbed in Tungsten
 - $v = c$
 - Small x-section
- Neutrons:
 - $v_n \ll v_{K_L}$
 - Different kinematics

94% of neutrons associated with $T < 300\text{MeV}$

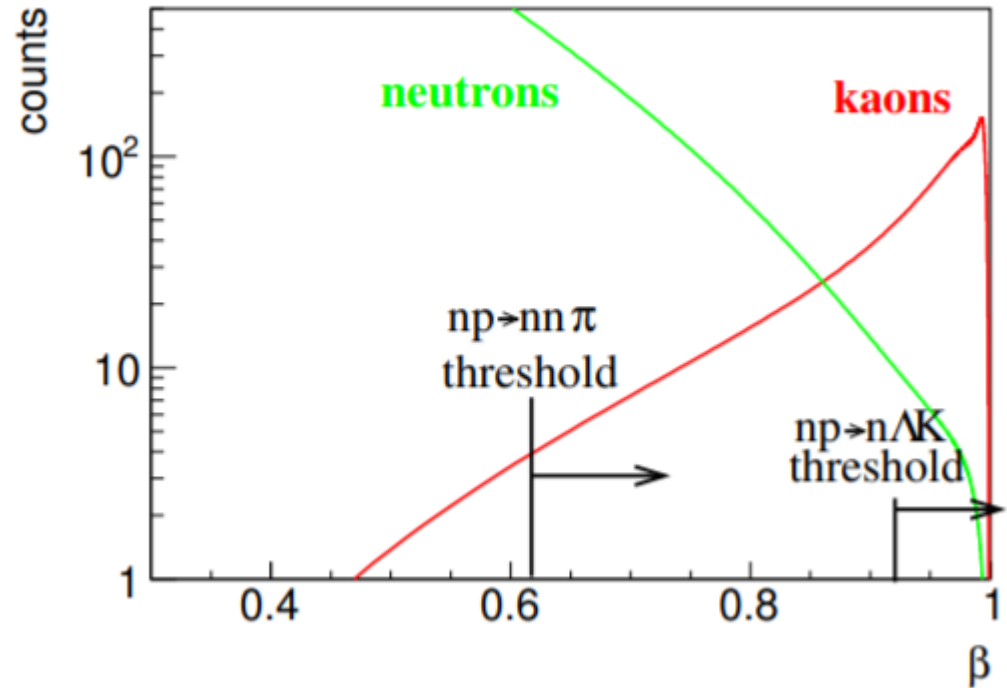
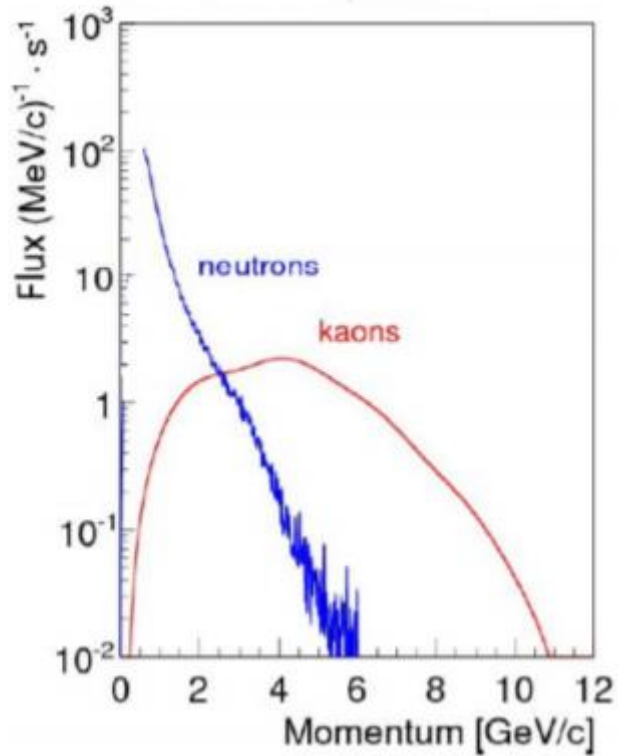


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Neutrons

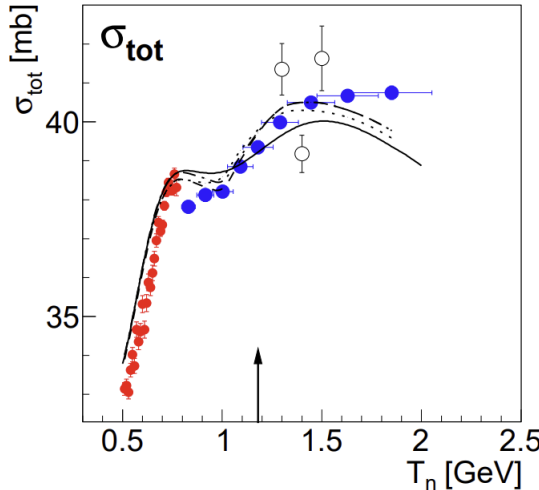
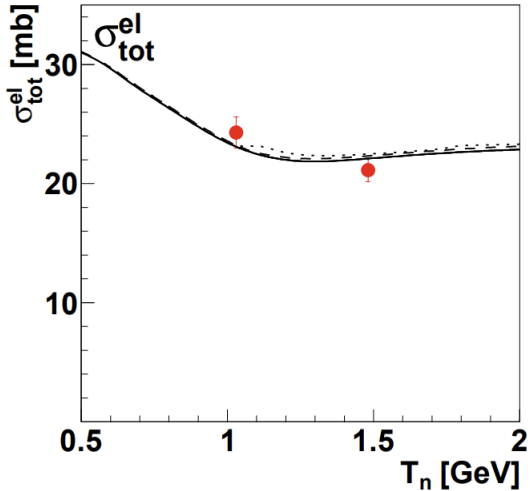


Neutron Background



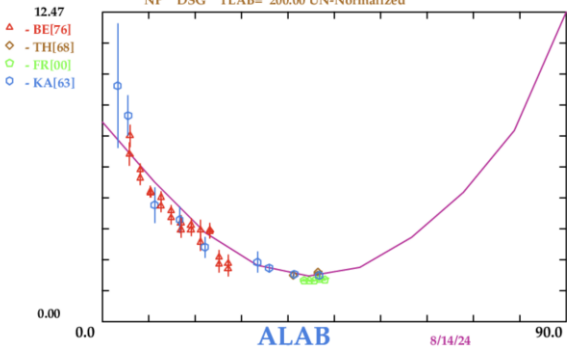
- $E_n > 1.6 \text{ GeV}$ (strangeness threshold) ~ 1% of neutron flux
- $0.3 < E_n < 1.6 \text{ GeV}$ (above pion threshold) ~ 5% of neutron flux
- $E_n < 0.3 \text{ GeV}$ ~ 94% of neutron flux – do not contribute

Neutron Cross-Sections



$E_n = 0.2 \text{ GeV}$

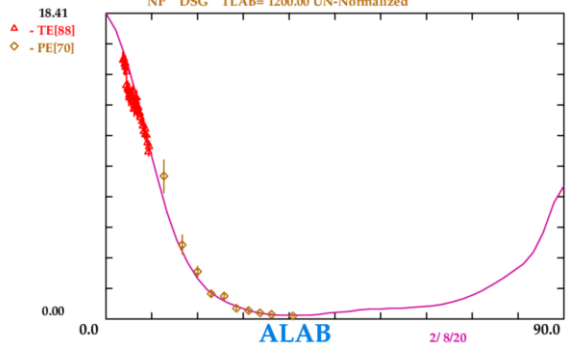
Plotted data is for TLAB=194.00 to TLAB=210.00
NP DSG TLAB= 200.00 UN-Normalized



SM16 0-3.0 GEV PP=50276/25348 NP=22832/12938 RAA [147] 5/
NN091 Nucleon-Nucleon 05/09 Amdt[NIJM] 11/07/21

$E_n = 1.25 \text{ GeV}$

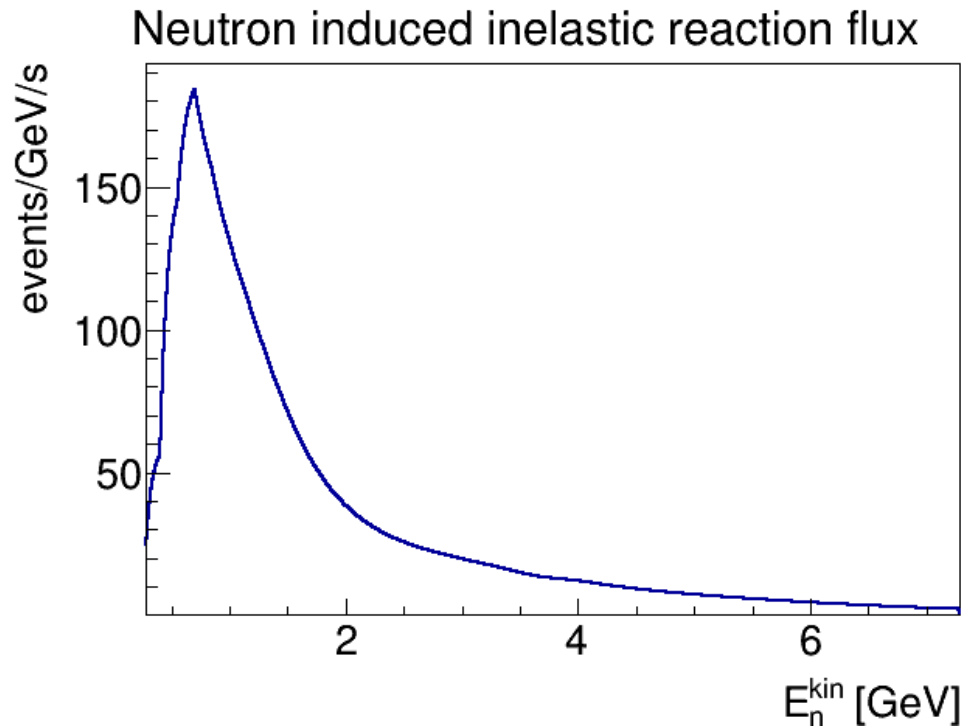
Plotted data is for TLAB=1118.20 to TLAB=1243.00
NP DSG TLAB= 1200.00 UN-Normalized



SM16 0-3.0 GEV PP=50276/25348 NP=22832/12938 RAA [147] 5/
NN091 Nucleon-Nucleon 05/09 Amdt[NIJM] 01/03/19

- Elastic cross-section forward-backward peaked
- Either beampipe or at 90 deg with $E \sim 0$

Neutron Reaction yield

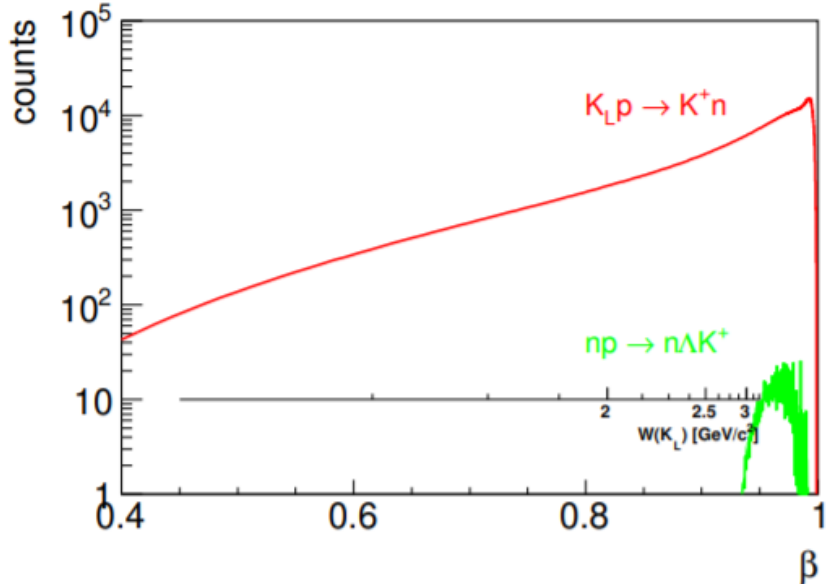


- Neutron-induced reaction rate: **233 ev/s**
- Total neutron-induced rate: **400 ev/s**
- Neutron-induced data rate: **85Gb/day**

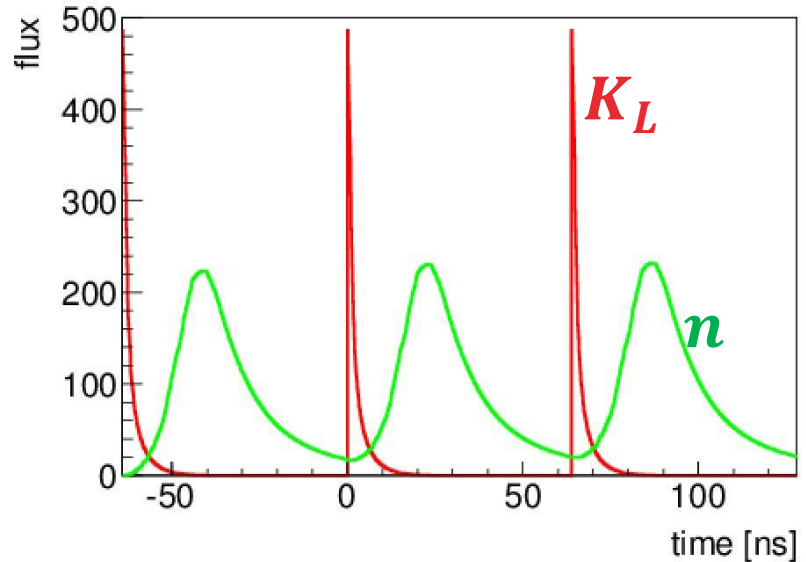
Neutron Background



Reaction yield

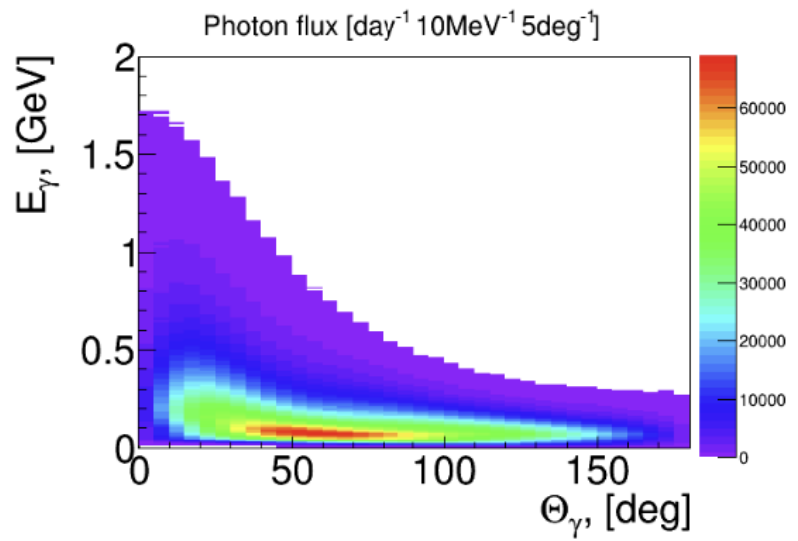
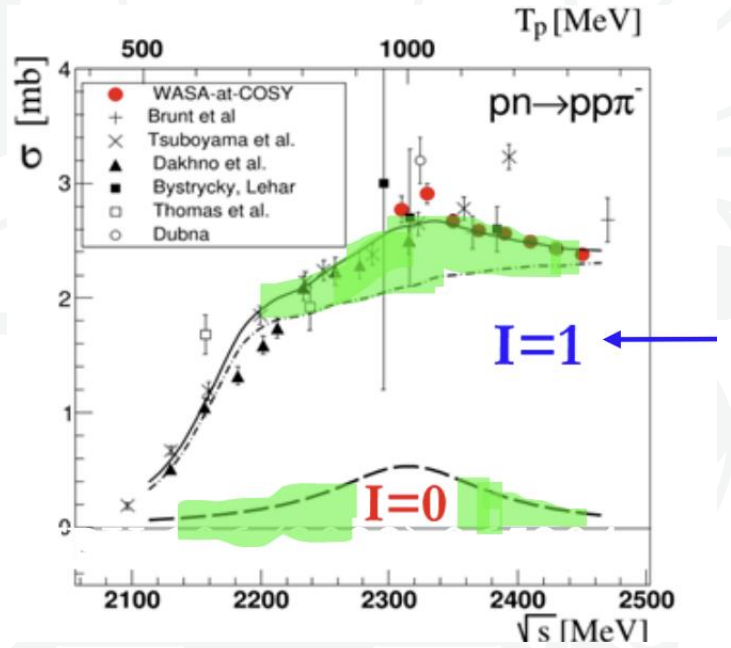


Bunch time structure



- Neutron-induced reactions are not an issue for the main program

Useful Neutrons: Calibration



- Neutron-induced reactions are isospin $I=1$ dominated
- Can be used for calibration $np \rightarrow np\pi^0$
- $\sim 24M$ γ 's from neutron-induced π^0 production per day
- Neutron-induced reactions have high scientific interest!

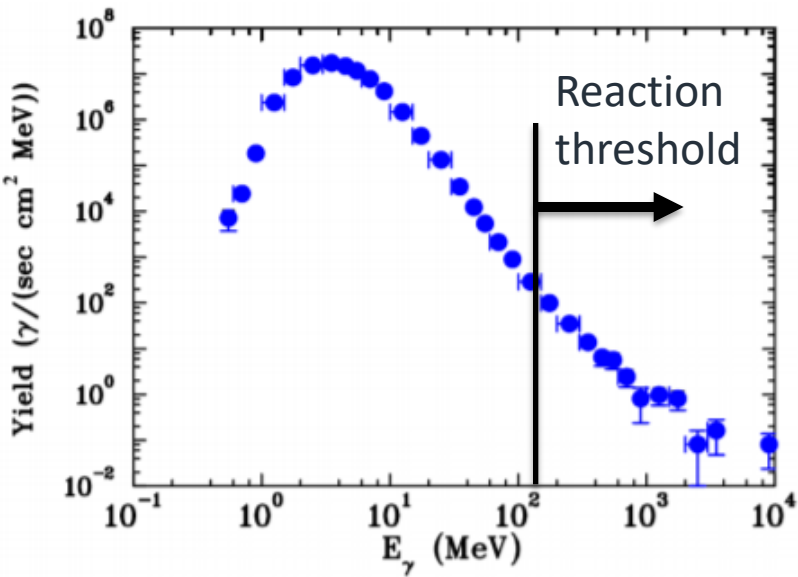


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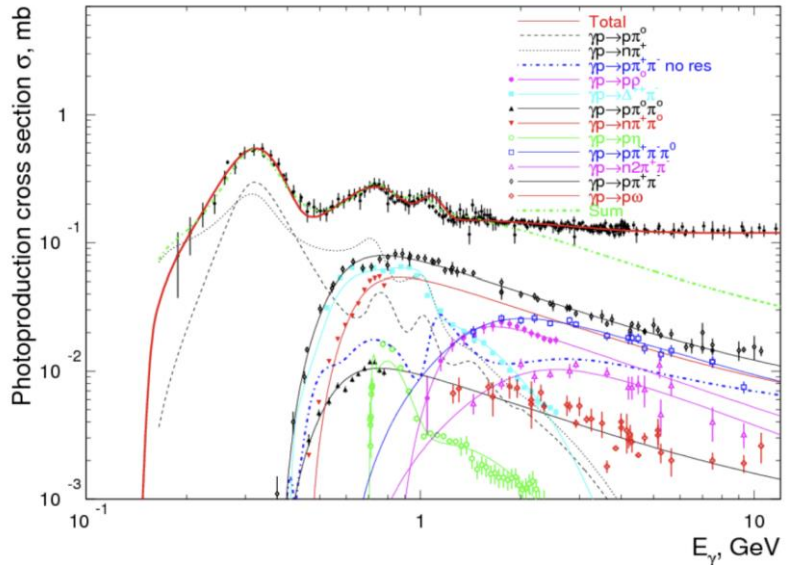
Photons



Photon background



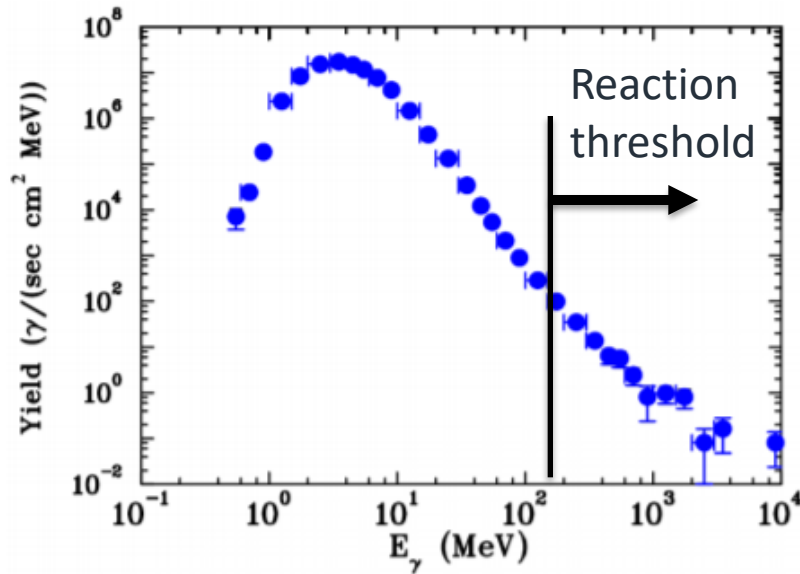
Photon flux at LH2/LD2



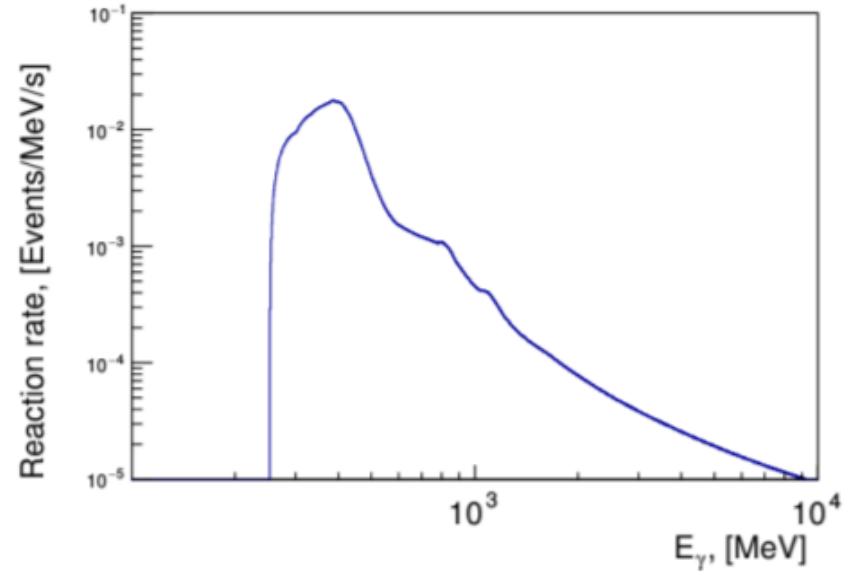
Photoinduced reaction rate

- Photoinduced reaction rate < 4Hz

Photon background



Photon flux at LH2/LD2



Photoinduced reaction rate

- Photoinduced reaction rate $< 4\text{Hz}$
- Photoinduced data rate: negligible
- Photoproduction reactions are not an issue for the main program

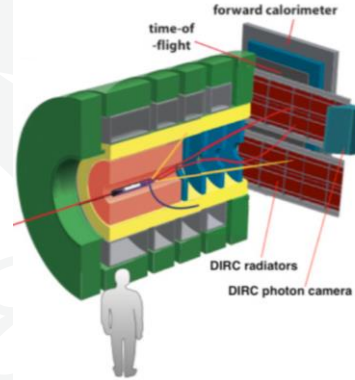


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Cosmics



Cosmic muon background



- Cosmic rate induced rate: $\sim 500 \text{ ev/s}$
- Cosmic rays are not an issue for the main program



Total budget

Reactions	Rate [kHz]
K_L –induced	1.0
n –induced	0.4
γ –induced	0.004
cosmics	0.5
Total	~2.0

- **Total data stream ~1Tb/day**

Conclusion

- Background conditions at KLF are very mild
- No background problems at trigger level
- No physical background problems at reconstruction level.
- Data rate is very low – no problems with storage