

SoLID SPD Segmentation Study

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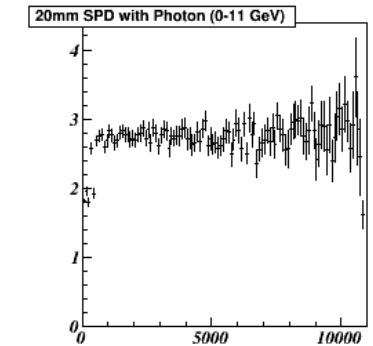
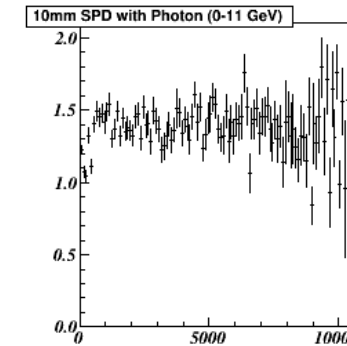
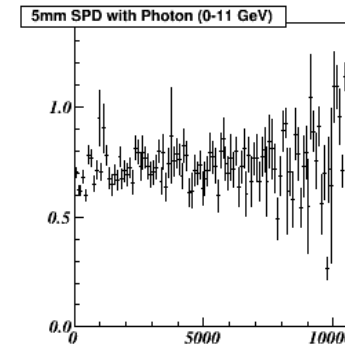
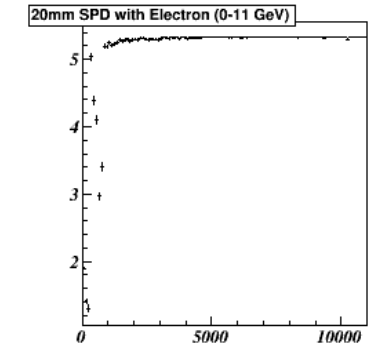
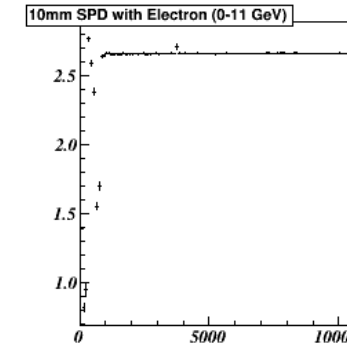
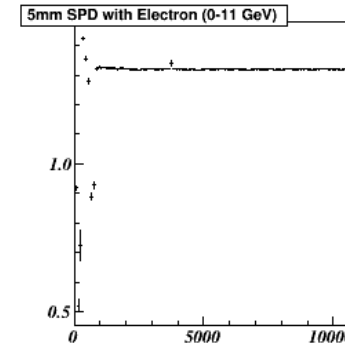
SPD - Rates

Two types of electrons that can deposit energy in the SPD:

(a) electrons before SPD:

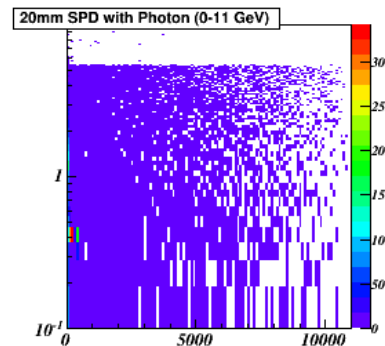
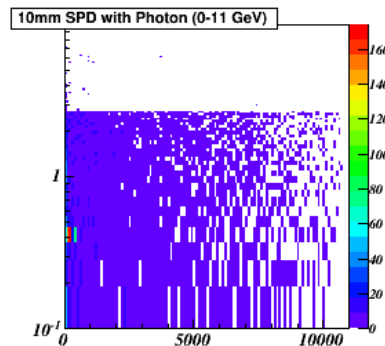
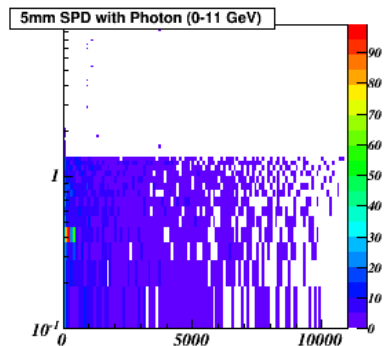
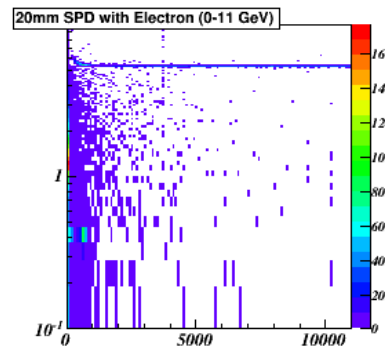
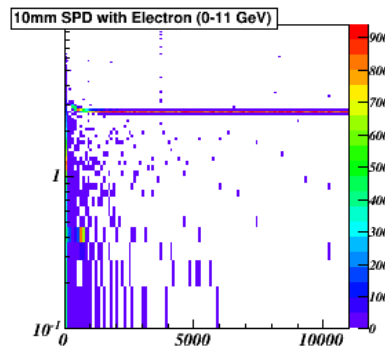
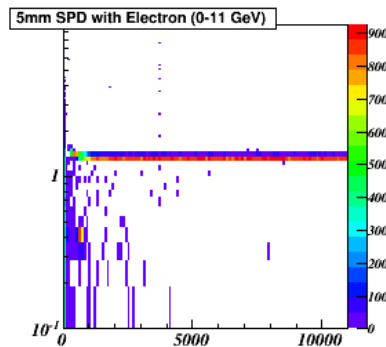
1, So if the particle is an electron, I use its energy to search the average energy deposition in the 2cm SPD

Rate = Rate_from_Generator (or cross sections)



2, If it is a photon, I calculate the conversion rate first (see next slide)

3, running Edep for all other charged particles (assumed to be the same as electrons right now, although I know it is wrong)



SPD - Rates

Two types of electrons that can deposit energy in the SPD:

(b) electron created by photo pair production when travelling inside the 2cm SPD:

1, Photon does not deposit energy in SPD but creates electron+positron first which deposit their energies

2, For a given photon with known energy, I obtained the conversion rate from the chart,

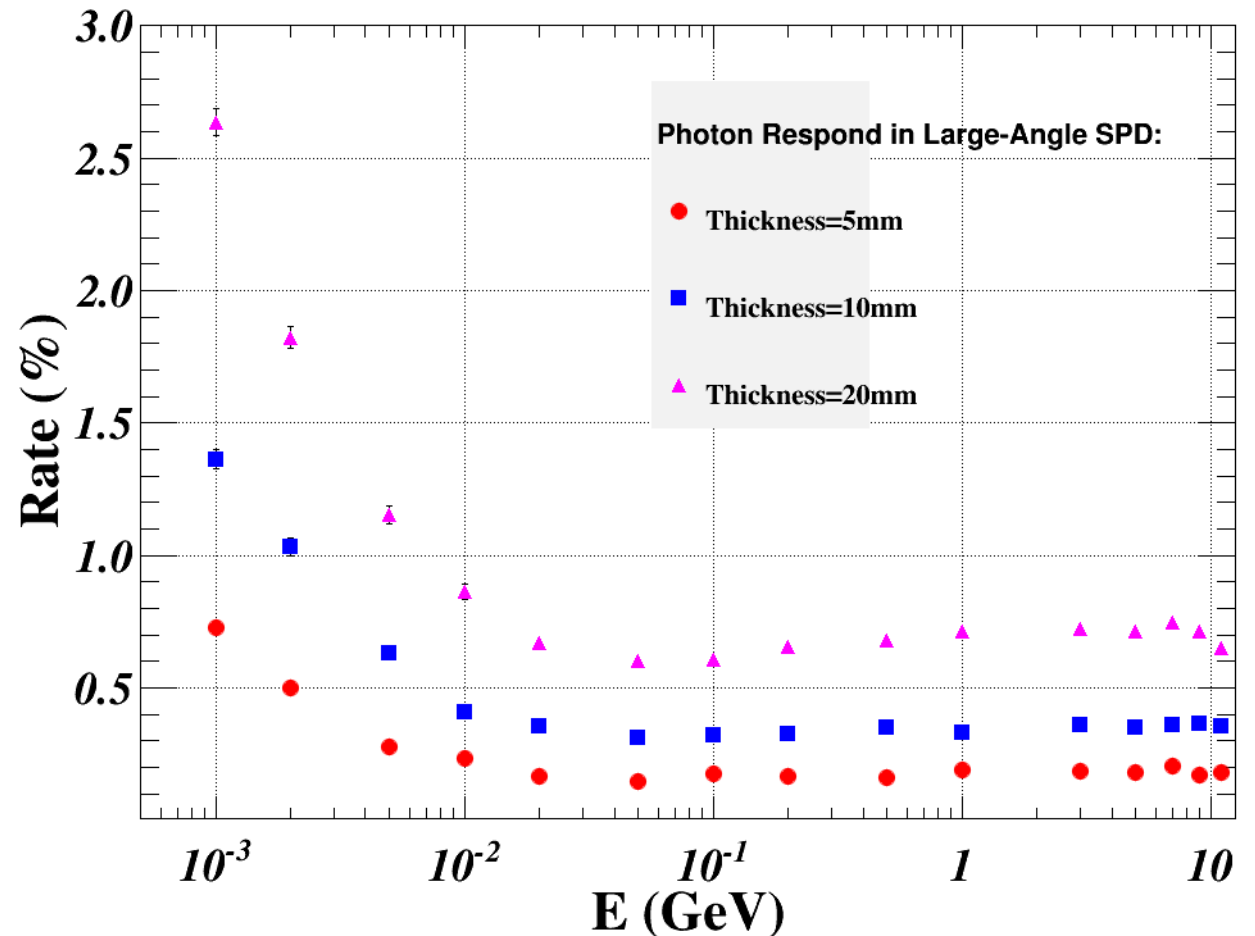
e.g., 1000 photon with $E = 1\text{GeV}$,

$$\begin{aligned}\#\text{electron+photon} &= 1000 * 0.7\% * 2 \\ &= 7 * 2 = 14\end{aligned}$$

3, Assuming the electron and the positron have the same energy (roughly close), the energy deposited by these particles (or “by the photon”) is:

$$E_{\text{dep}}(E_0, \text{photon}) = 2 * E_{\text{dep}}(E_0/2, \text{electron})$$

$$\text{Rate} = \text{Conversion_Rate} * \text{Rate_from_Generator}$$



FASPD - Rates

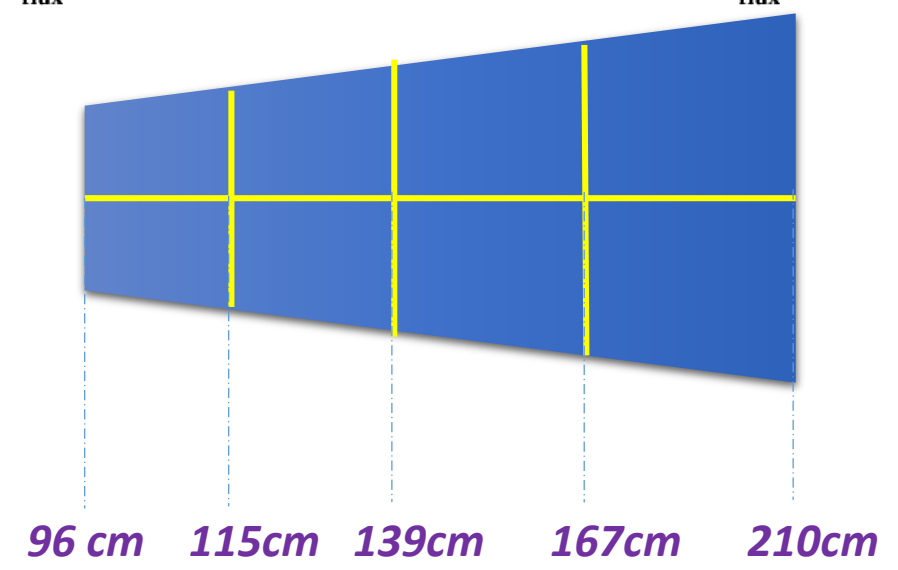
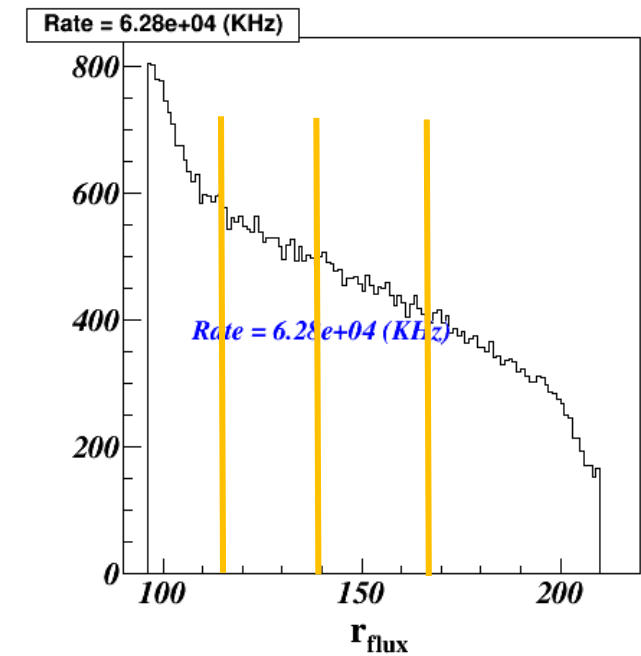
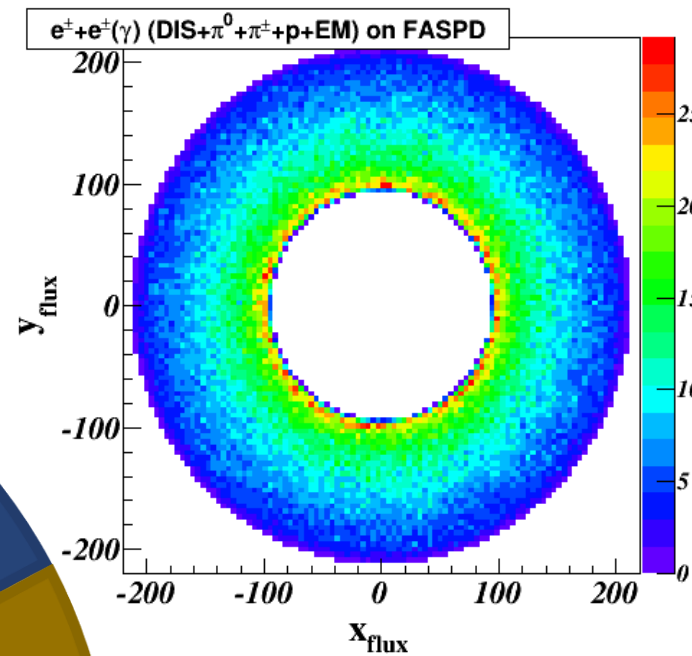
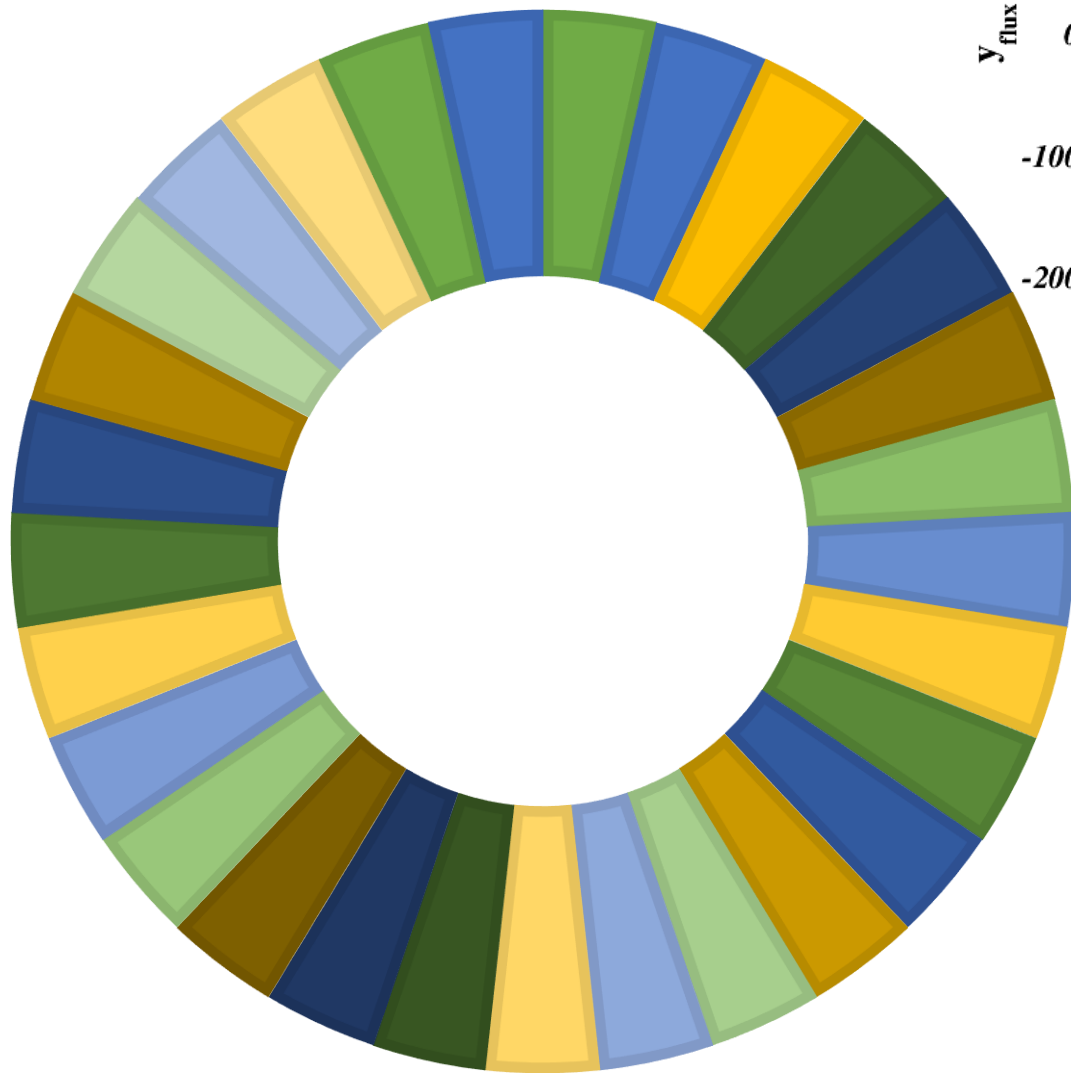
Raw electron rate from different sources (no cuts and count every flux particle as one event)

(KHz)	eDIS	π^0 (T/up/down)	π^+ (T/up/down)	π^- (T/up/down)	Proton (T/up/down)	EM
e+/- & π^+ /- & p	150	1.90e4	5.20e3	4.13e3	12.01e3 (p=1.12e3, e+/-=84.33)	0
e+/- (γ)	0	1.61e4	2.61e3	2.66e3	0.94e3	0
all	150KHz	35.1MHz	7.81MHz	6.80MHz	12.95MHz	0

<i>Quick check with FAEC cut</i>						
all	86.14 KHz	223.00 KHz	120.60 KHz	83.11 KHz	1.68 MHz	0

FASPD SEGMENTATION

LASPD 30 MODULES



LASPD - Rates

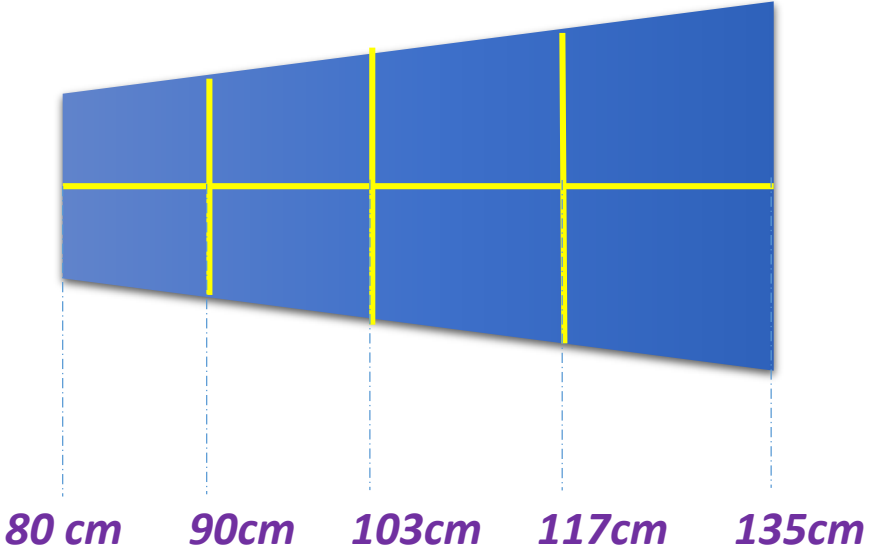
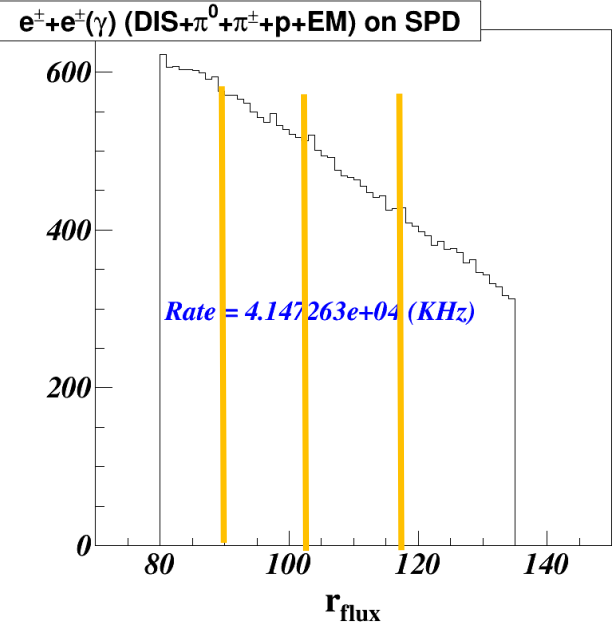
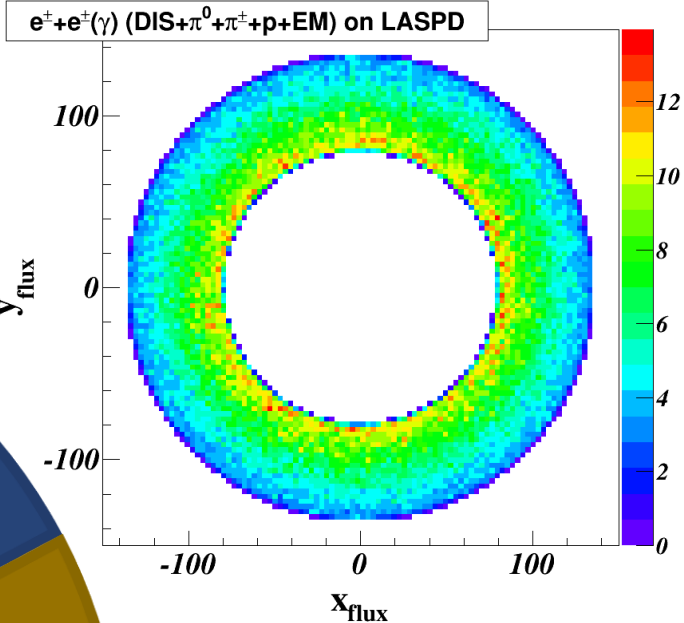
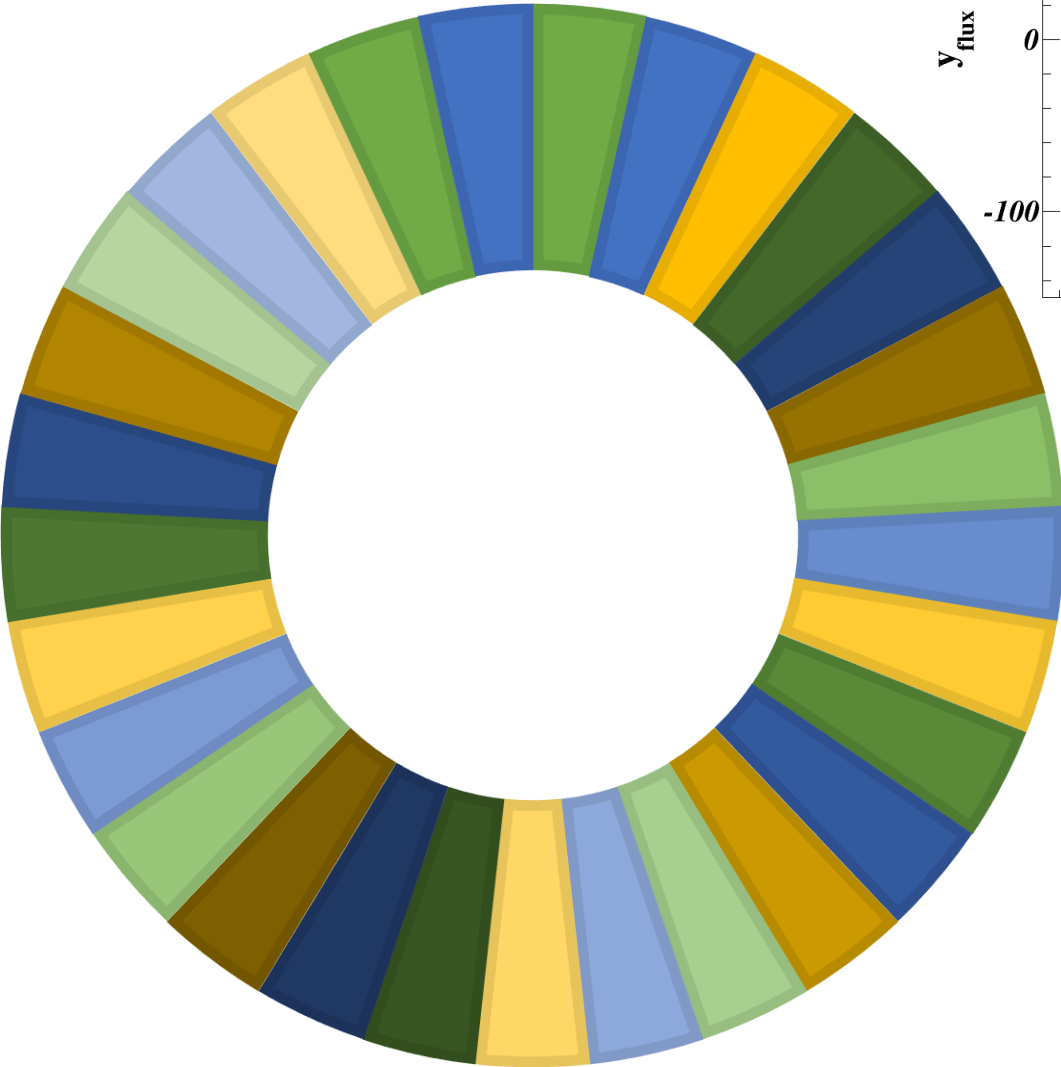
Raw electron rate from different sources (no cuts and count every flux particle as one event)

(KHz)	eDIS	π^0 (T/up/down)	π^+ (T/up/down)	π^- (T/up/down)	Proton (T/up/down)	EM
e+/- & $\pi^+/-$ & p	46.08	6.75e3	4.79e3	3.63e3	9.12e3	0
e+/- (γ)	0	23.10e3	3.29e3	3.40e3	0.75e3	0
all	46.08	29.85MHz	8.08MHz	7.03MHz	9.87MHz	0

<i>Quick check with LAEC cuts</i>						
all	11.85	1.36 KHz	0.65 KHz	0.49 KHz	29.30 KHz	0

LASPD SEGMENTATION

LASPD 30 MODULES



Just a check since we are not going to slide each module

FASPD Energy Deposition and Pile-Up

To Do (after discussing with Jin):

- 1, Events will be cut with the EC R-Dependence Curves
- 2, 30 Modules and each module has 8 segments == 240 segments
- 3, Add events within 40nS
- 4, Need to consider the backward scattering events (could change the Edep .vs. E curves)

In Progress ...