Fermilab

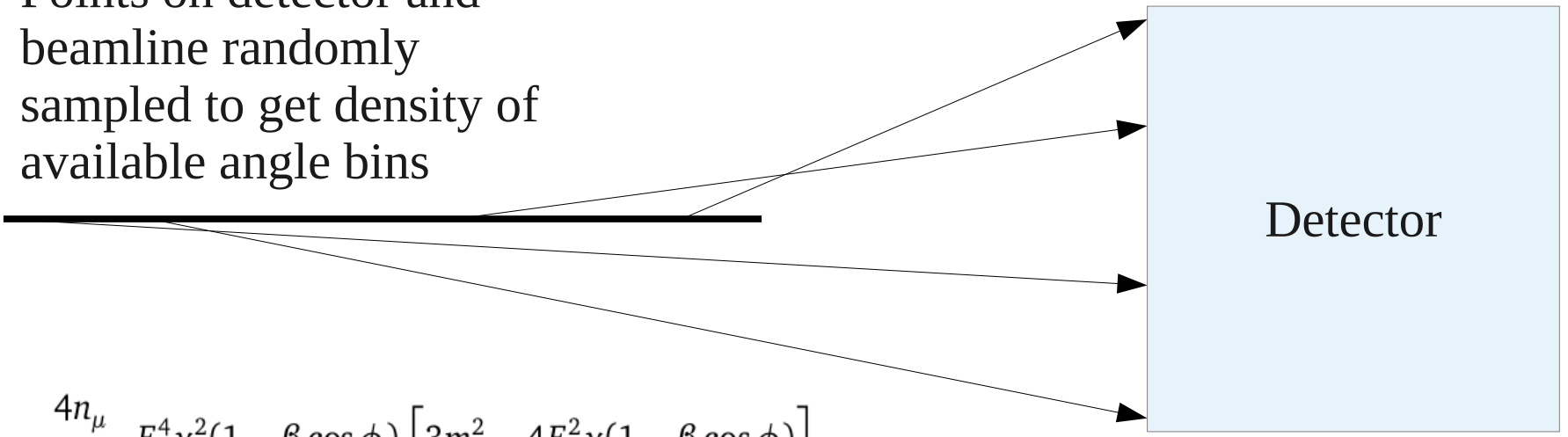
νSTORM

Flux and rates at the detectors

D Adey

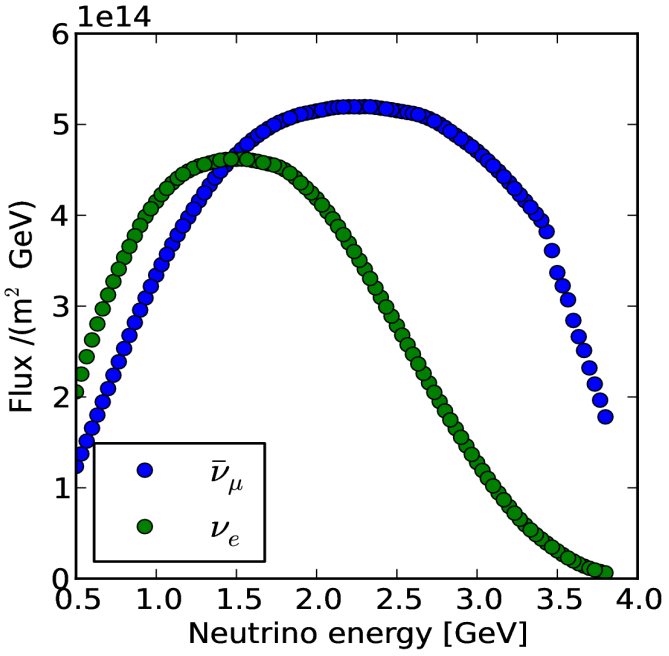
nuSTORM Phone Meeting
7th February 2014

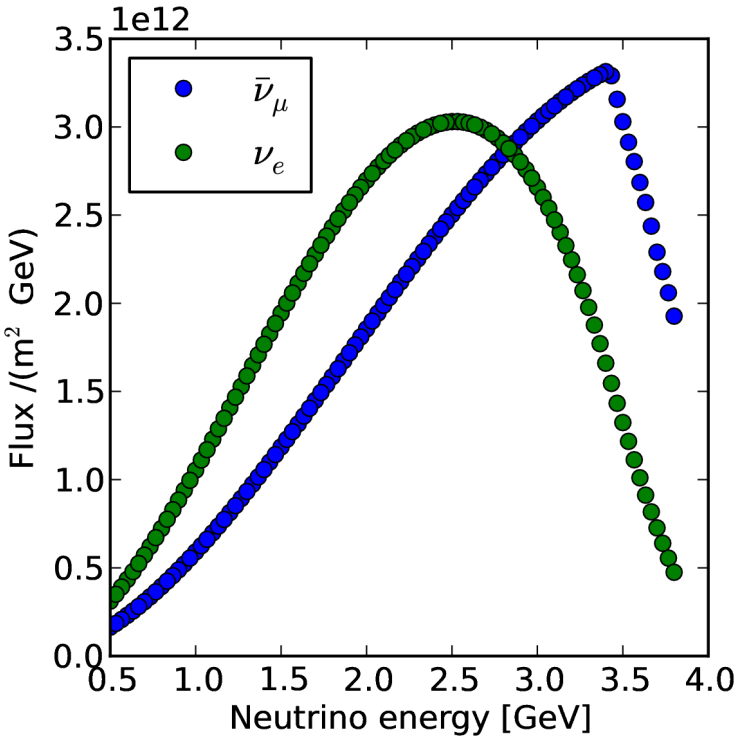
Points on detector and beamline randomly sampled to get density of available angle bins



$$\frac{d^2N_\mu}{dy\,dA} = \frac{4n_\mu}{\pi L^2 m_\mu^6} E_\mu^4 y^2 (1-\beta\cos\phi)\left[3m_\mu^2 - 4E_\mu^2 y(1-\beta\cos\phi)\right],$$

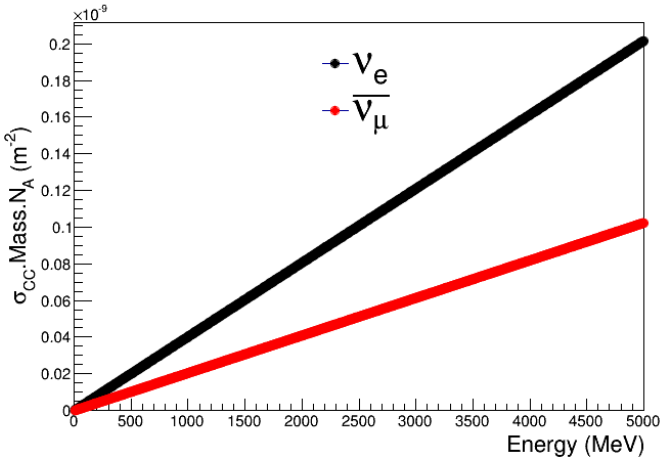
$$\frac{d^2N_e}{dy\,dA} = \frac{24n_\mu}{\pi L^2 m_\mu^6} E_\mu^4 y^2 (1-\beta\cos\phi)\left[m_\mu^2 - 2E_\mu^2 y(1-\beta\cos\phi)\right],$$

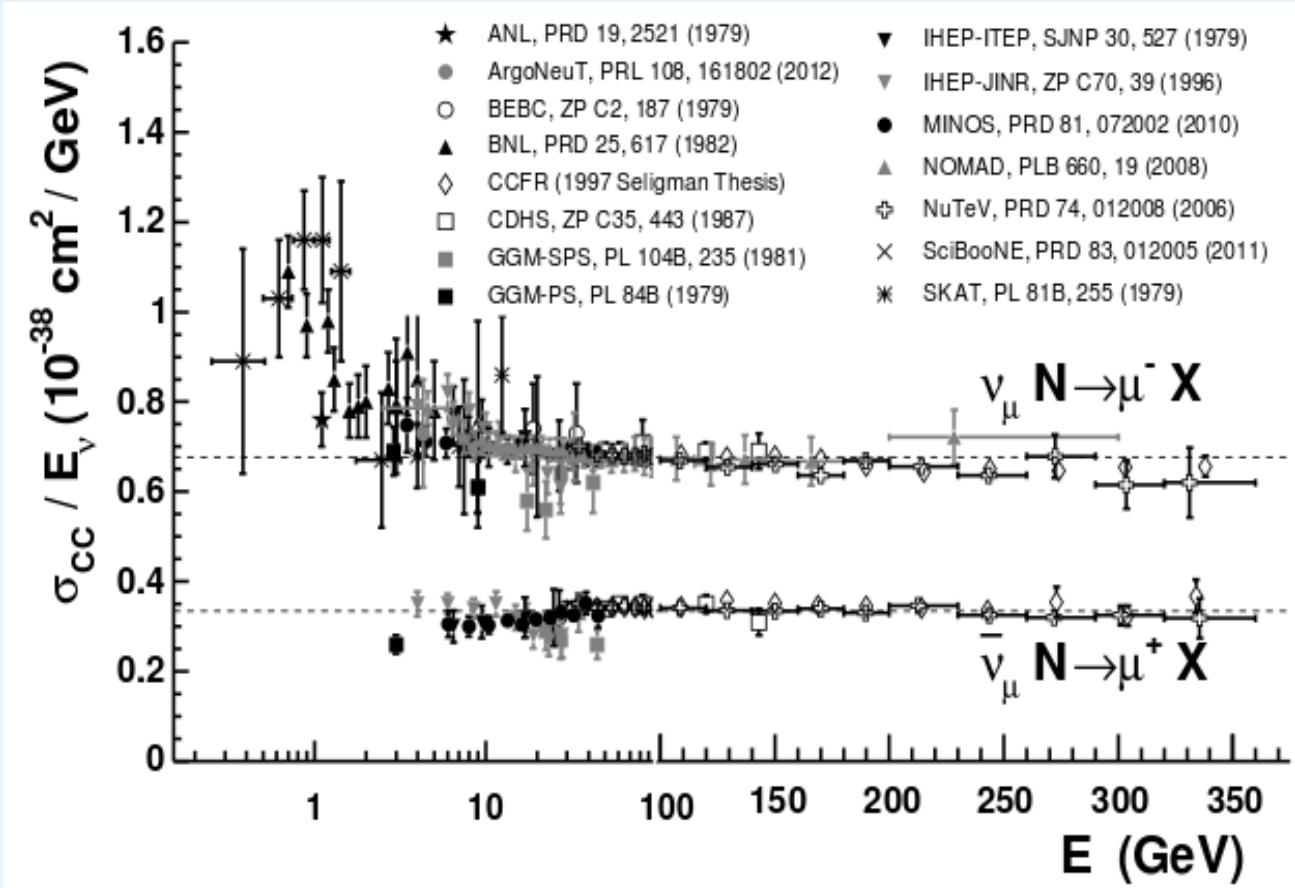




Assuming CC cross sections linear with energy

All plots shown for CC





Anti-neutrino CC - 0.34 x 10^{-42} m^2 / GeV

Neutrino CC - 0.67 x 10^{-42} m^2 / GeV

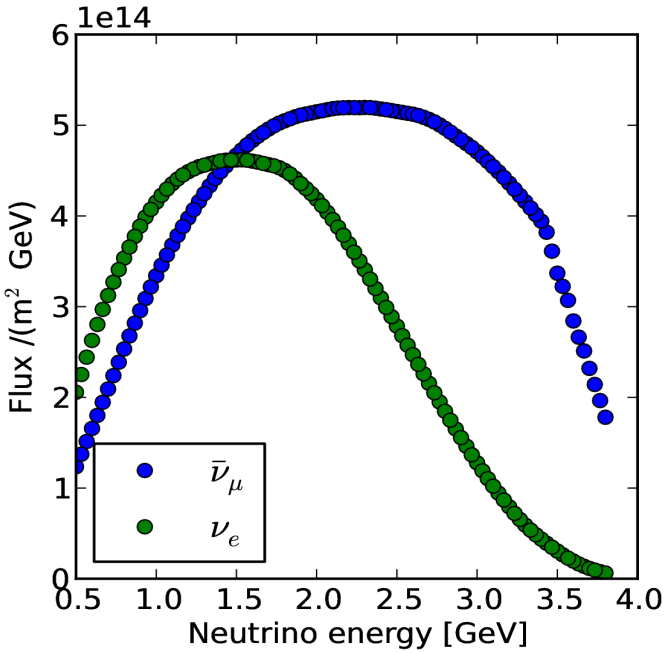
$$N_{CC}(E) = N_\nu(E)/m^2 * \sigma(E) * Mass * N_A$$

Flux at detector / area

Above cross sections in 5MeV bins

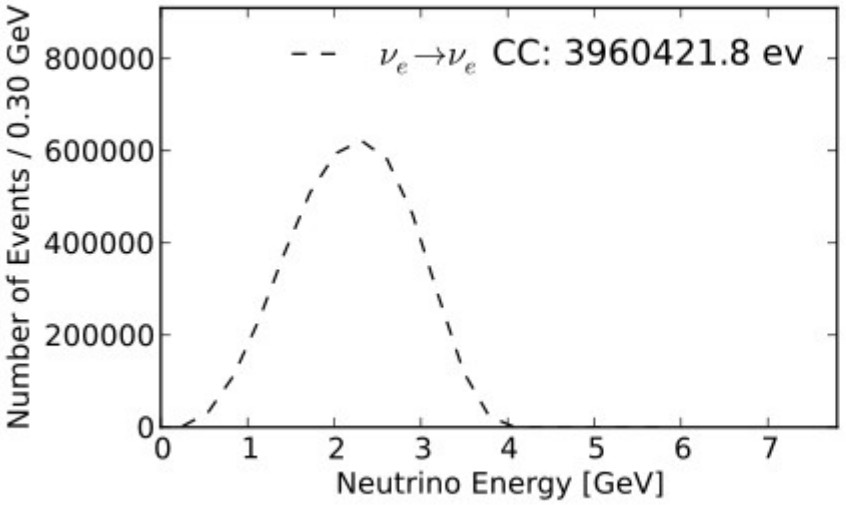
100T (converted to g)

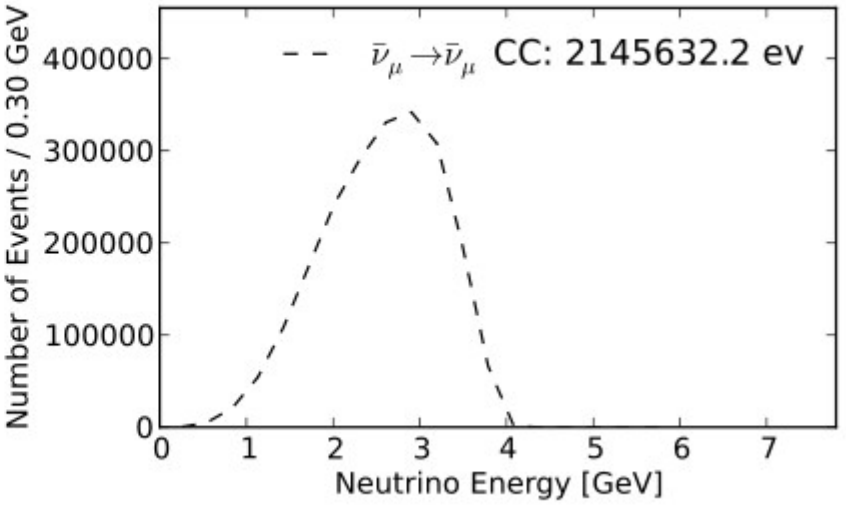
Nucleons / g

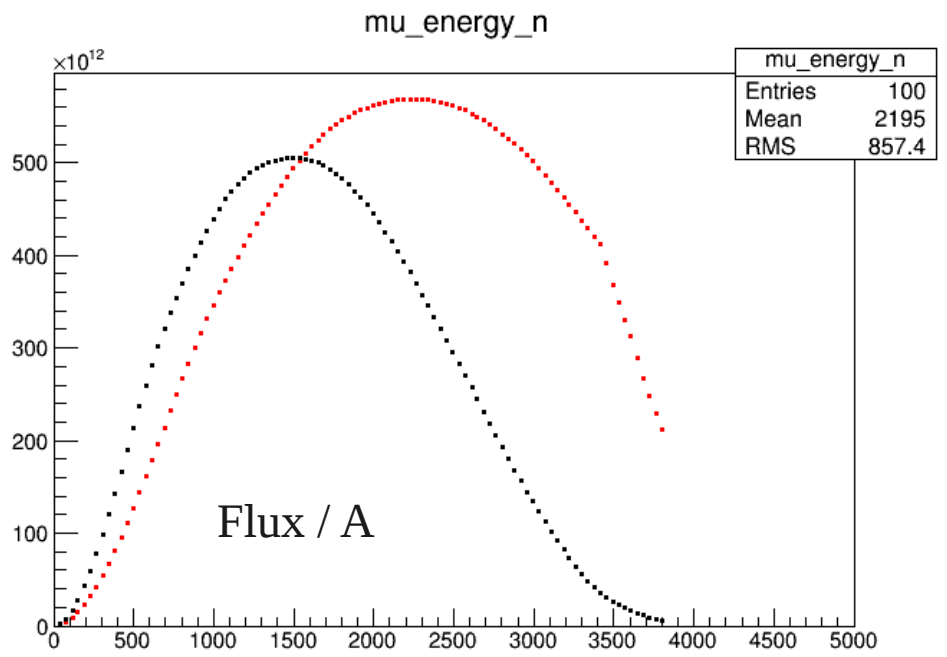


Issue was that output of old flux generator script could not produce rates shown in proposal – lower by factor of 2

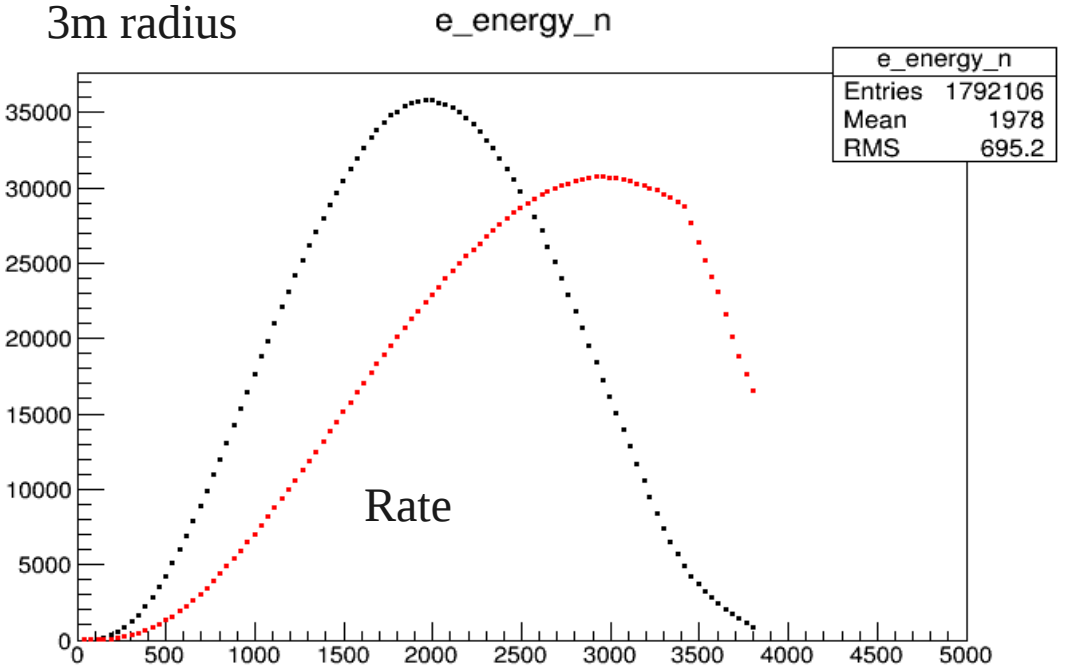
Discovered that proposal figures used detector radius of 1.5m not 3m

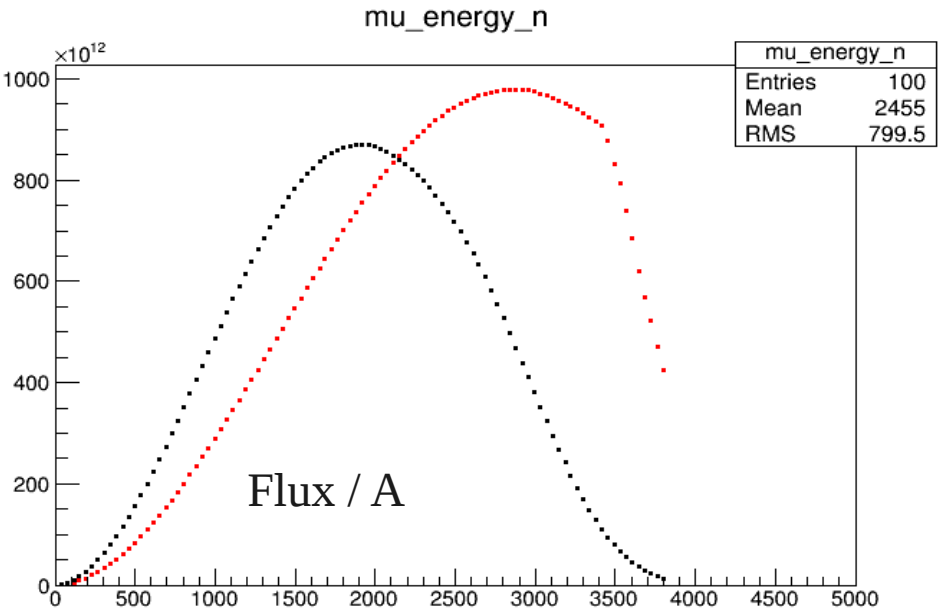




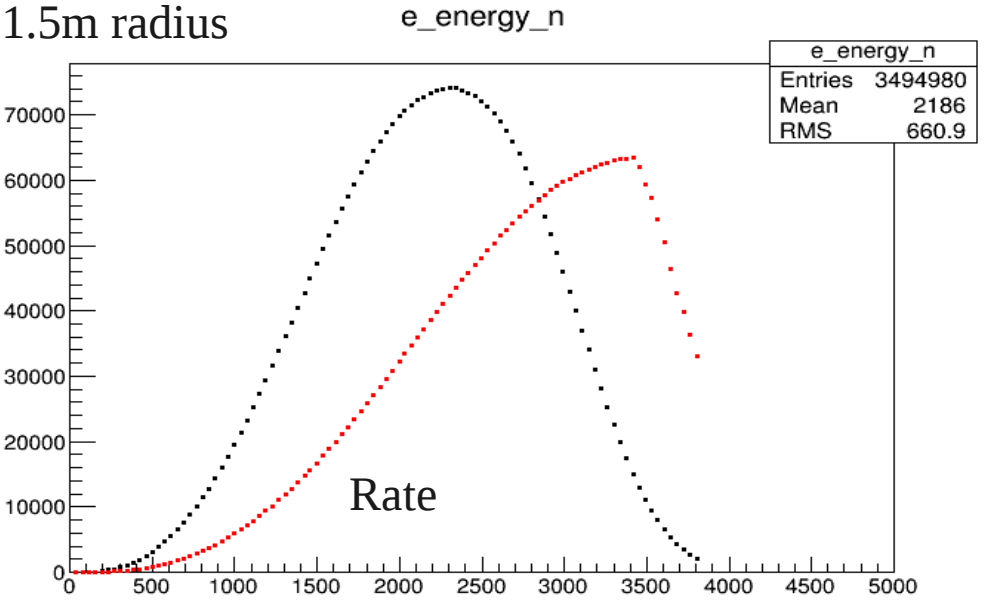


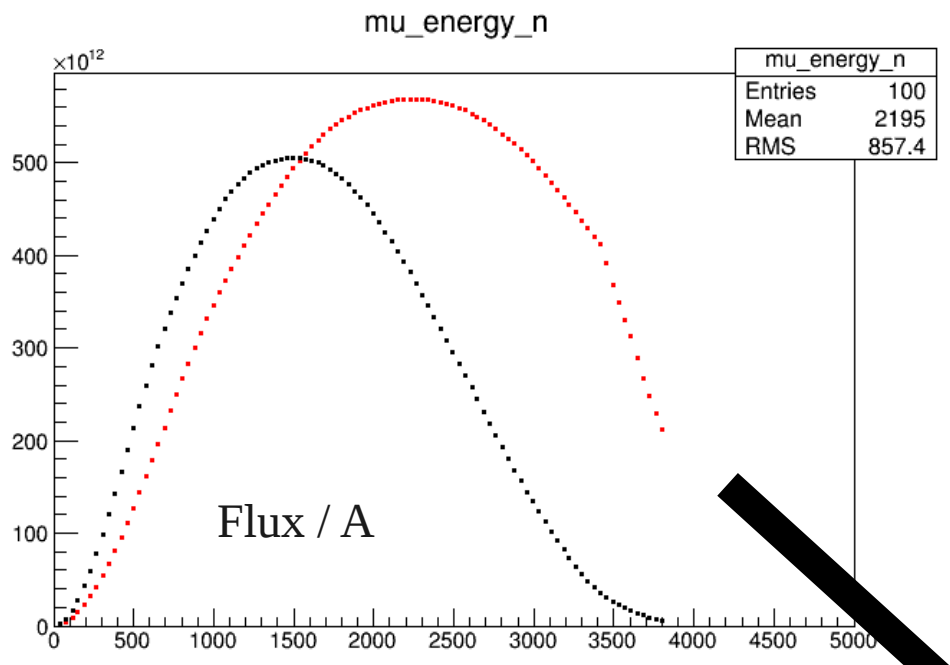
3m radius



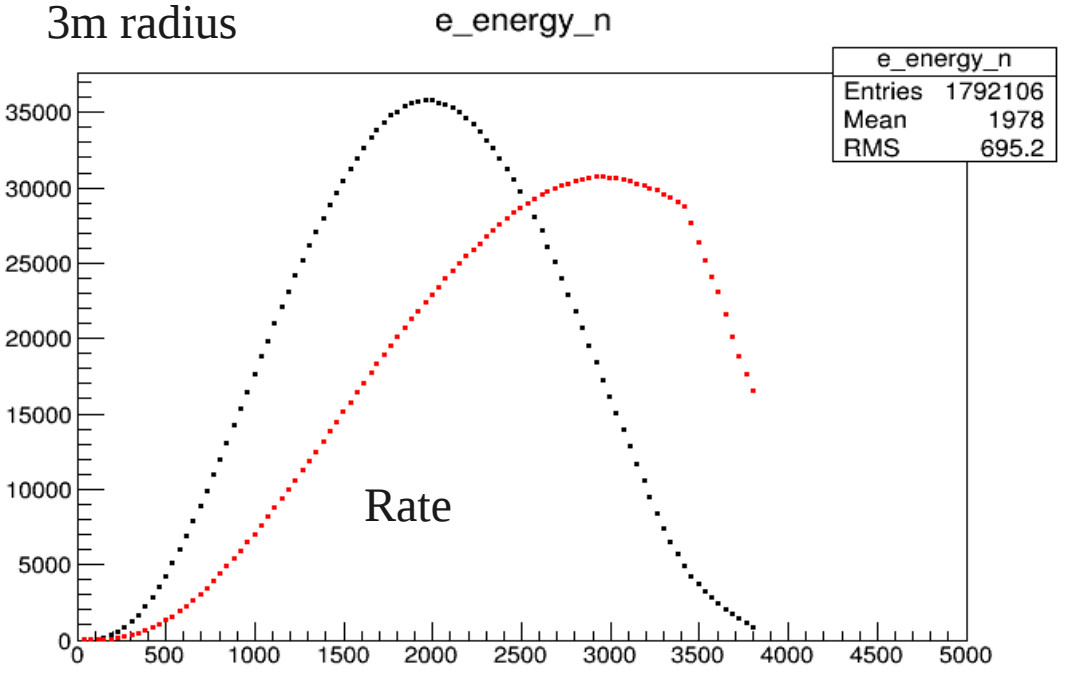


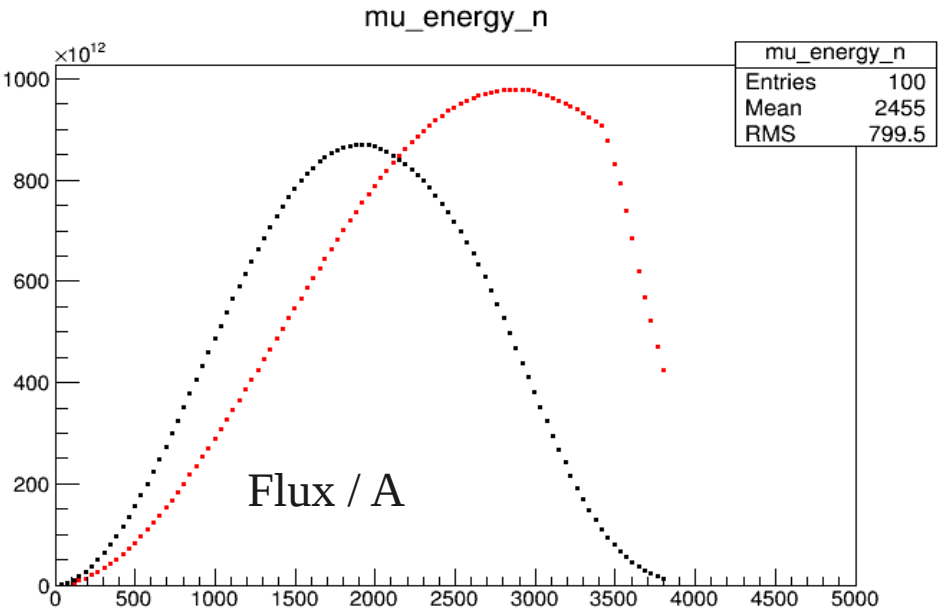
1.5m radius



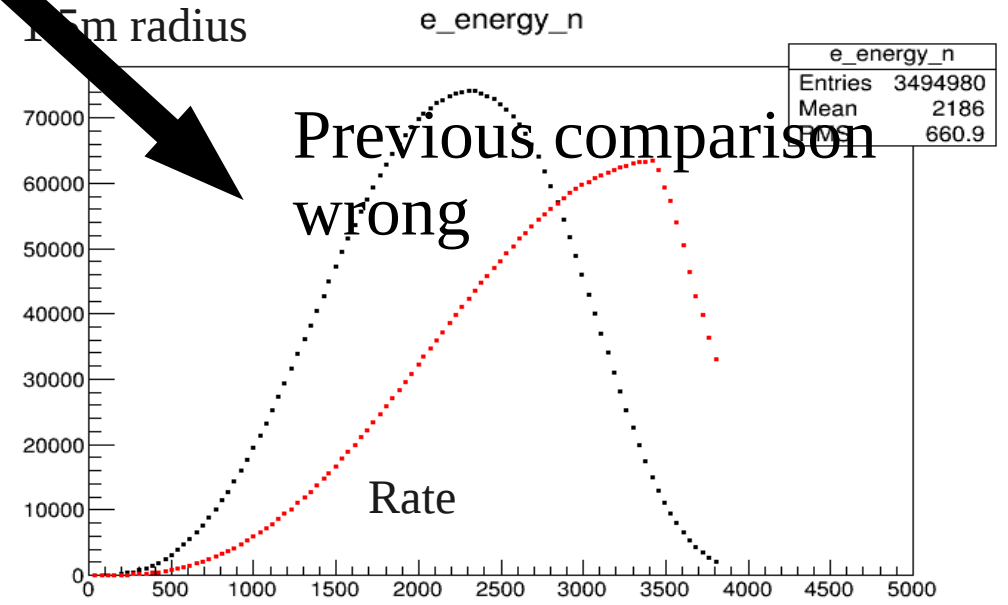


3m radius





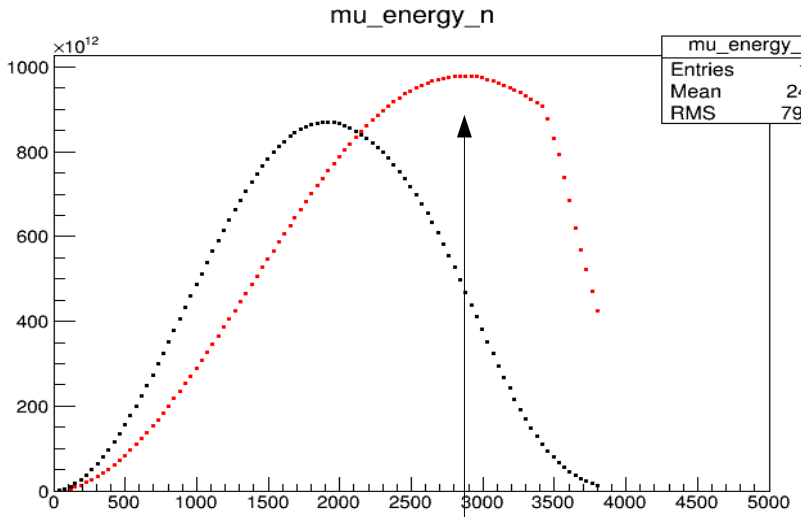
[illegible]m radius

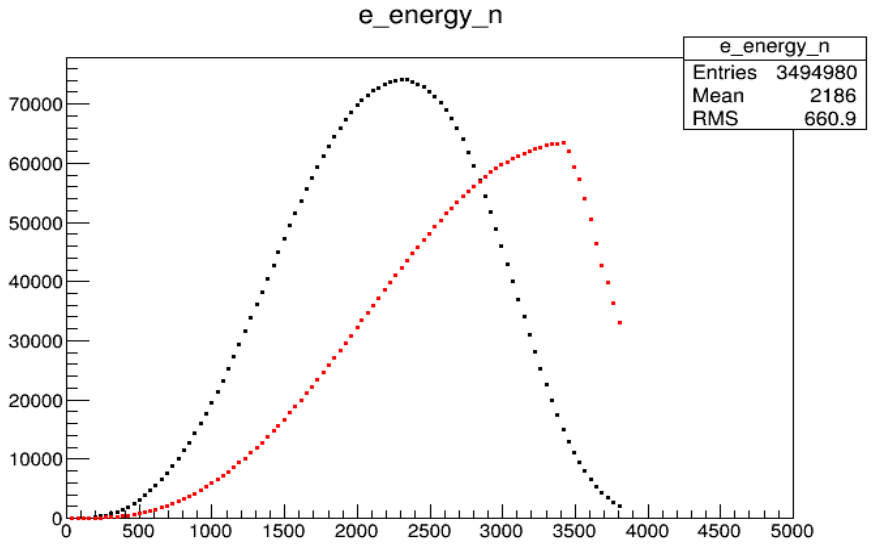


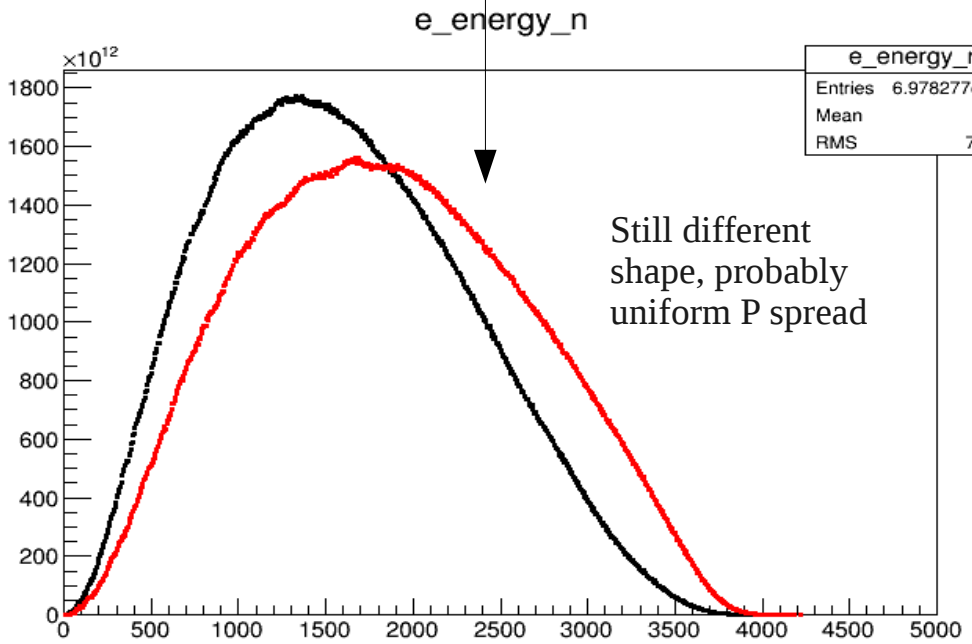
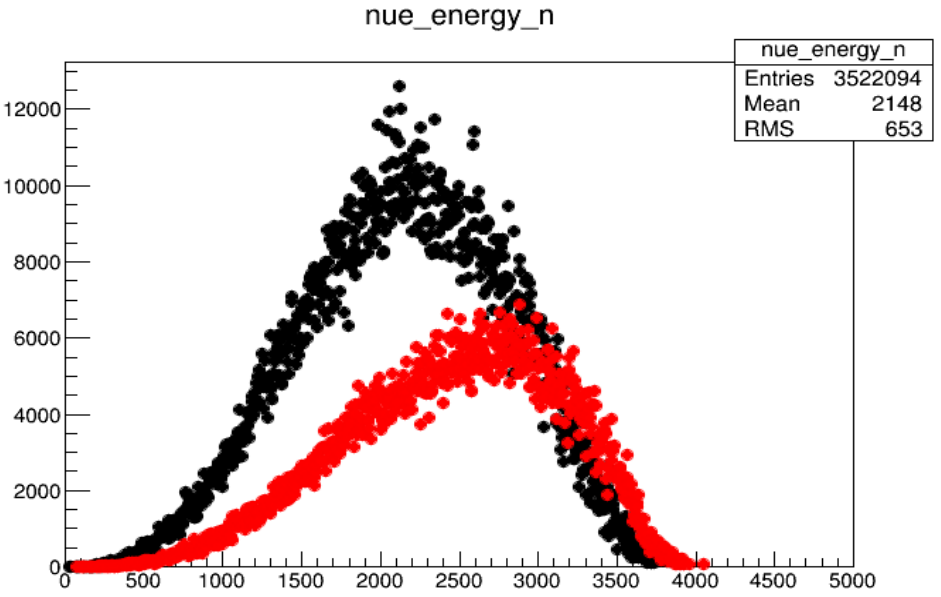
Previous comparison wrong

Interaction rates at near detector of 100T with 1.5m radius

Still can't entirely reproduce proposal numbers -> Globes







Still different shape, probably uniform P spread