
KLF beam simulation detector hit rates with baseline design

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Geant4 simulation of KLong beam

- Incorporates a detailed geometrical model of the KLF beamline
- Primary things we can learn from a Geant4 simulation:
 1. more complete modeling of **attenuation processes** that affect the Klong flux
 2. rates, spectra of background particles **accompanying the Klong flux**
 3. rates, spectra of background particles at the GlueX detector **outside the beam pipe**
 4. comparison of **alternate configuration** of shielding, absorbers
 5. identification of **critical beamline elements** to focus on for background reduction
- Adaptation of the GlueX hdgeant4 photon beam simulation
- Physics lists adopted from GlueX simulation
 1. [QGSP + Fritiof + Bertini cascade](#) model for hadronic interactions
 2. [standard electromagnetic](#) interactions + *special $\phi(1020)$ photoproduction process*
 3. detailed [low-energy neutron cross section tables](#) provided with G4

CPS Photon flux at the Klong target, corrected

Electron beam energy GeV

Electron beam current μA

Electron beam emittance m

Electron beam circular polarization

Radiator thickness m

Radiator secondary tilt rad

Photon spectrum peak energy GeV

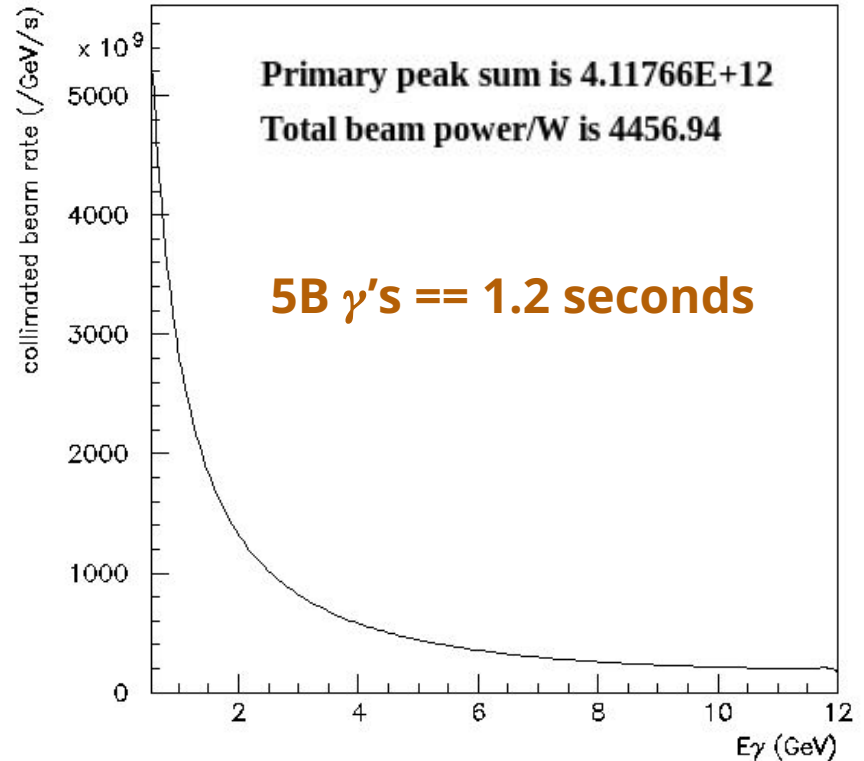
Number of bins in photon spectrum

Photon spectrum energy maximum GeV

Photon spectrum energy minimum GeV

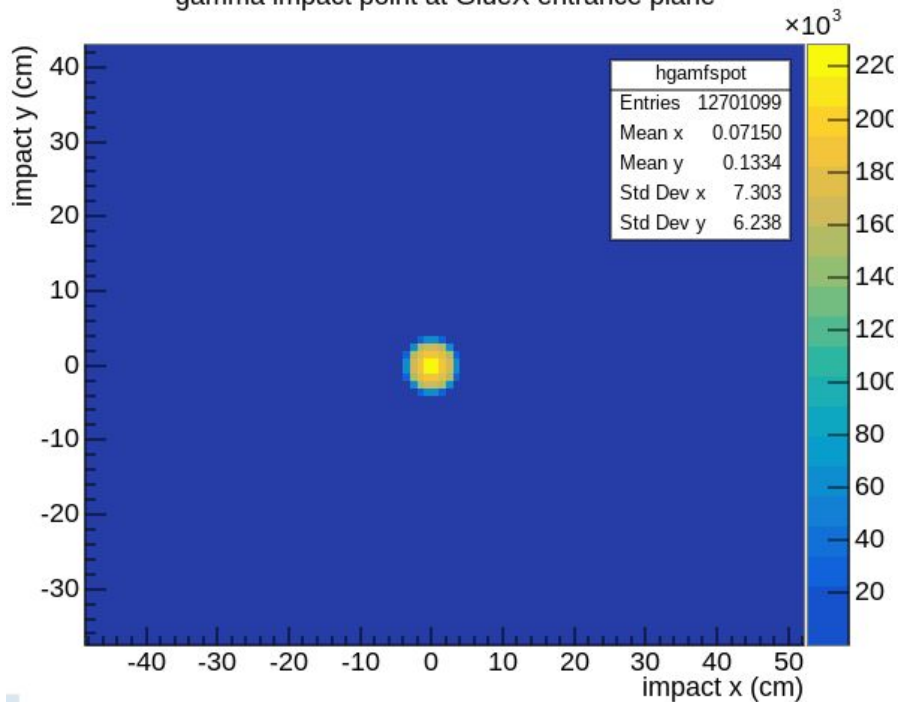
Radiator-collimator distance m

Collimator diameter m

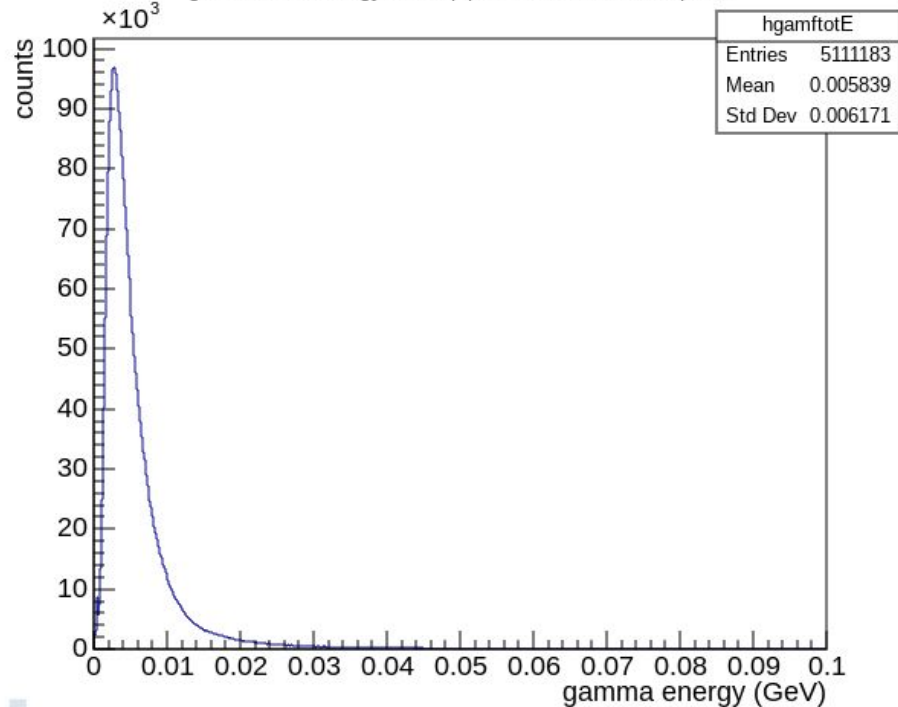


Results from 1.2ms of beam

gamma impact point at GlueX entrance plane



gamma total energy inside pipe at GlueX entrance plane

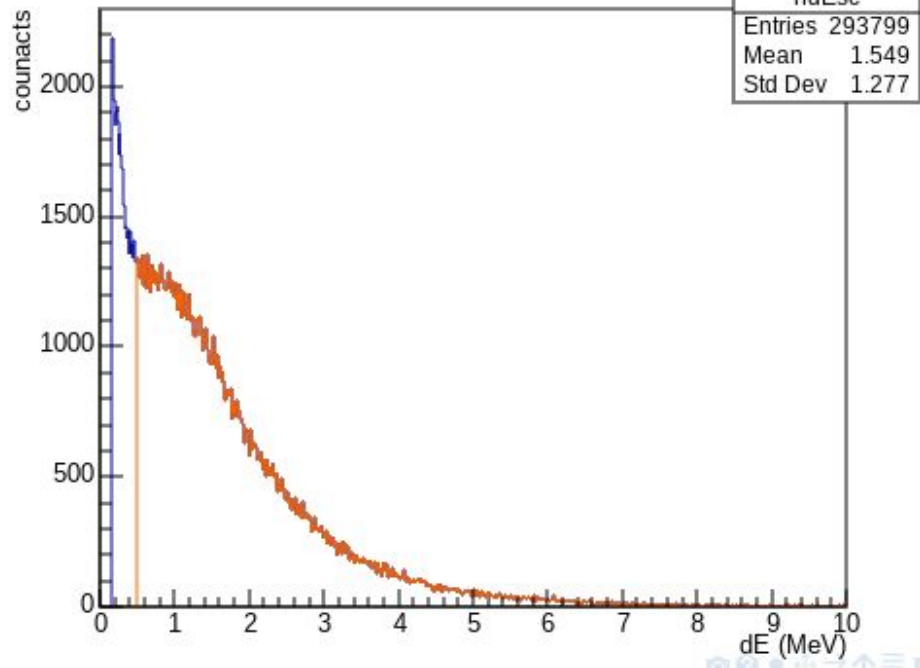


New results presented here

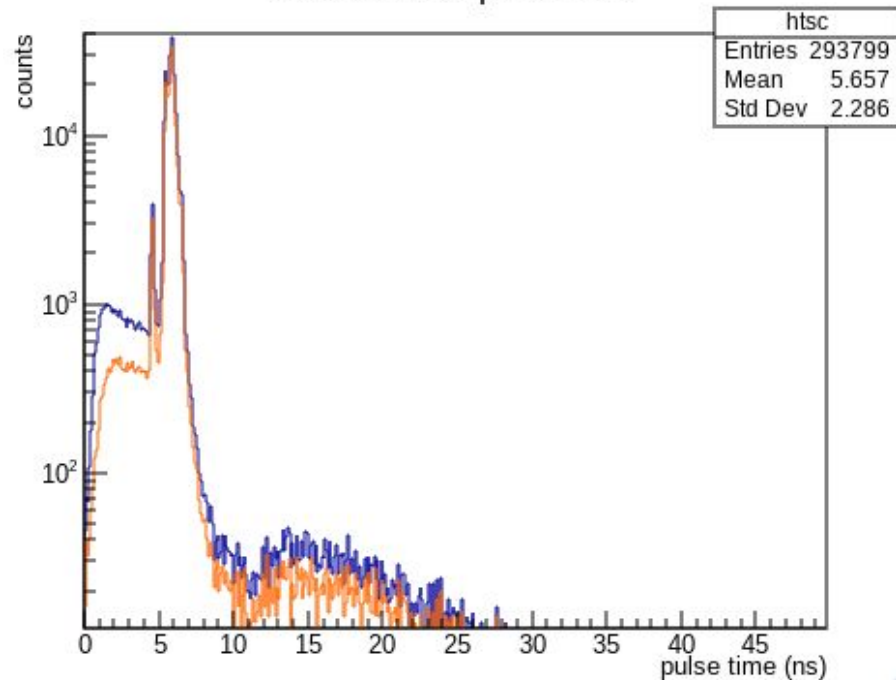
1. start counter hits
2. cdc and fdc hits
3. bcal and fcal hits (fcal-2 with ecal is not simulated, only fcal-1)
4. tof hits

Start counter hits

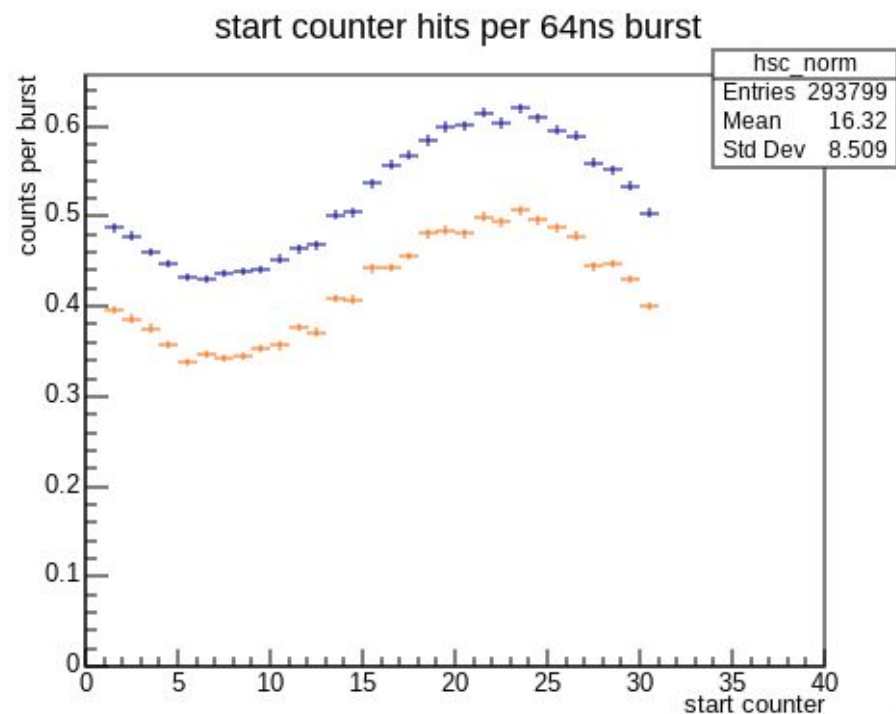
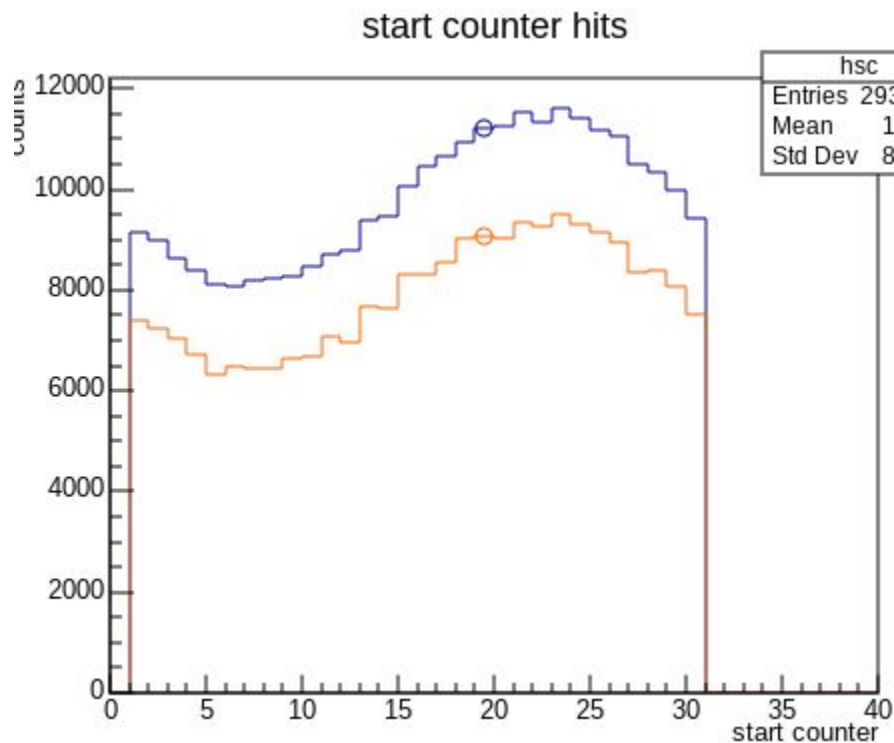
pulse height



start counter pulse time

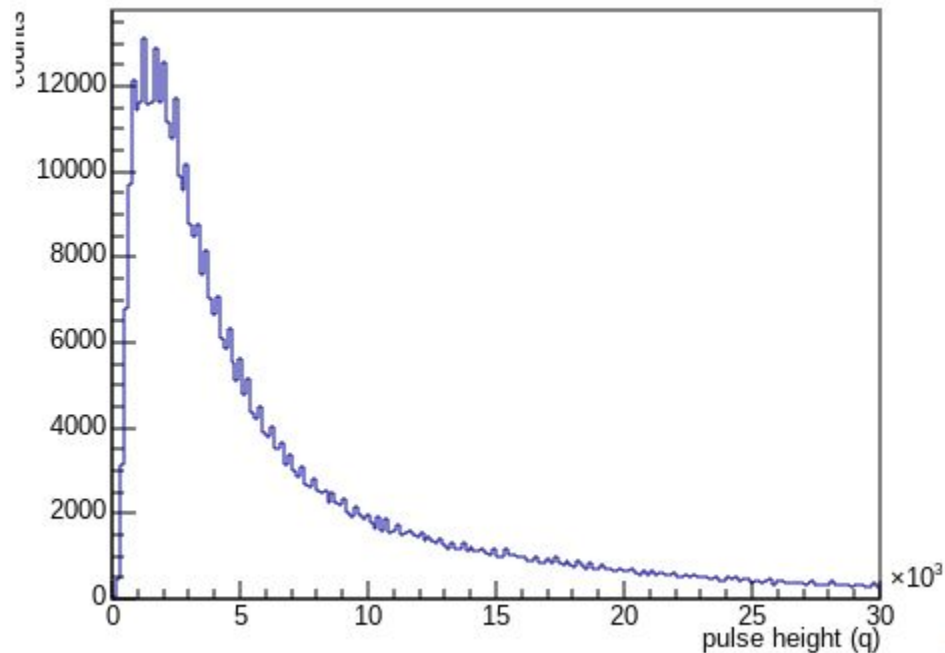


Start counter hits

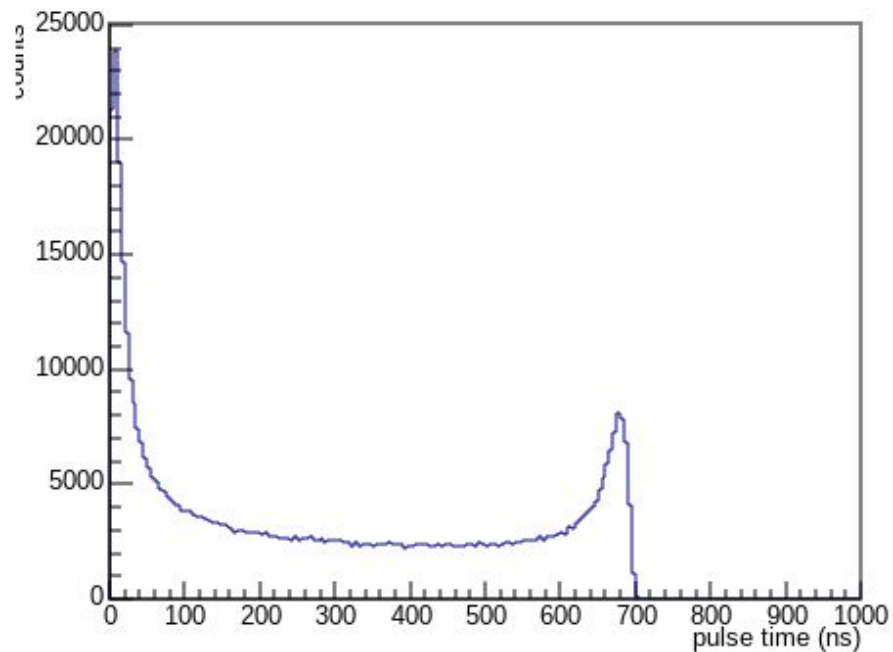


Central drift chamber hits

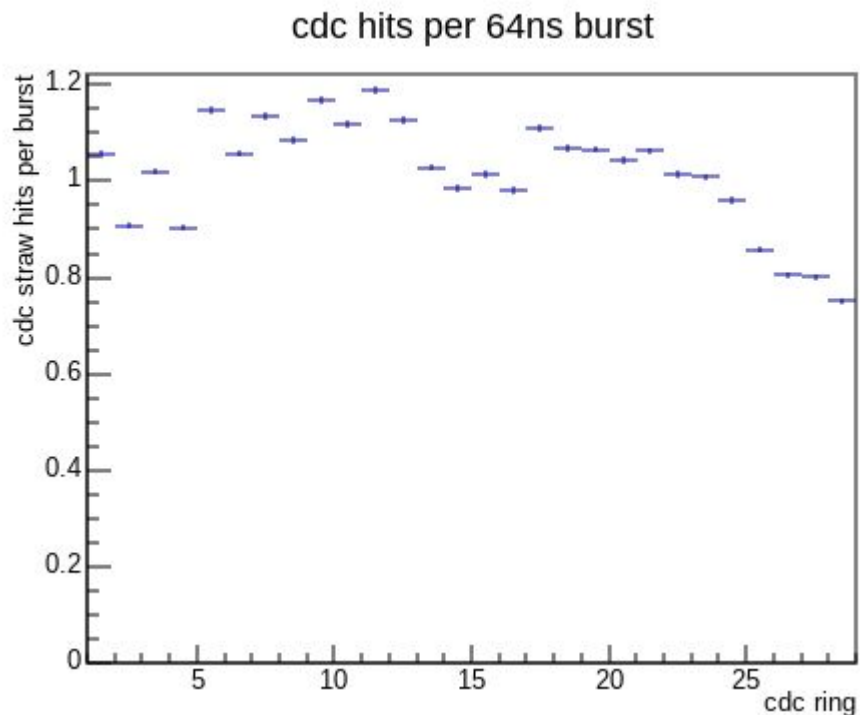
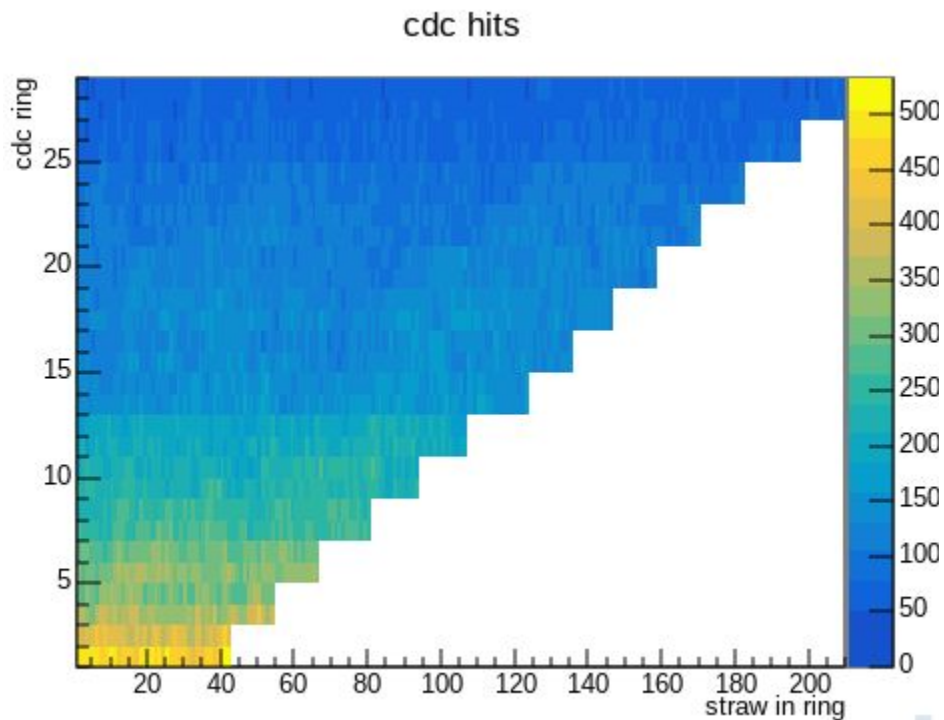
cdc pulse height



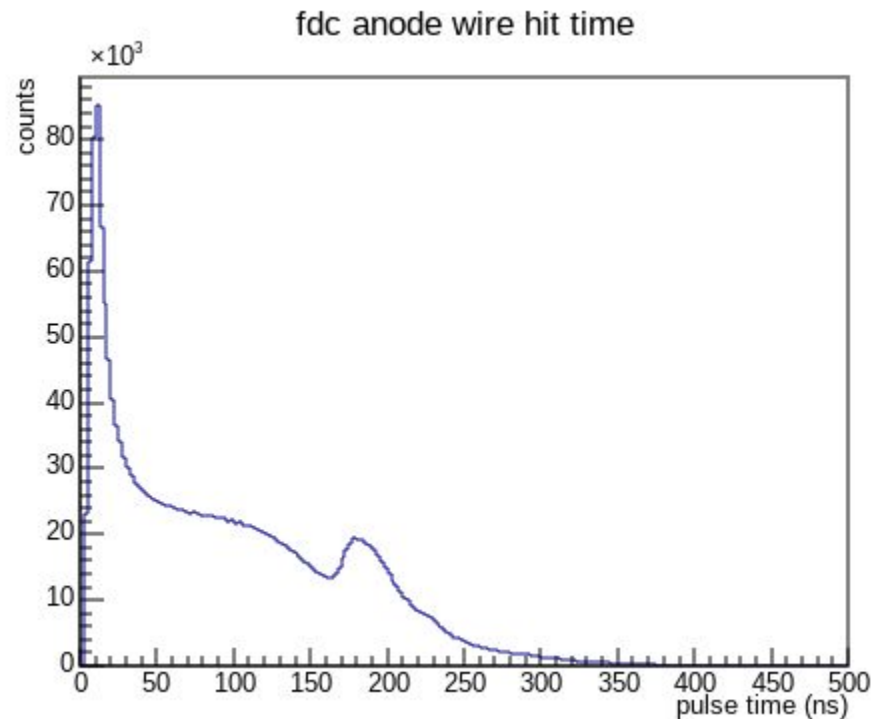
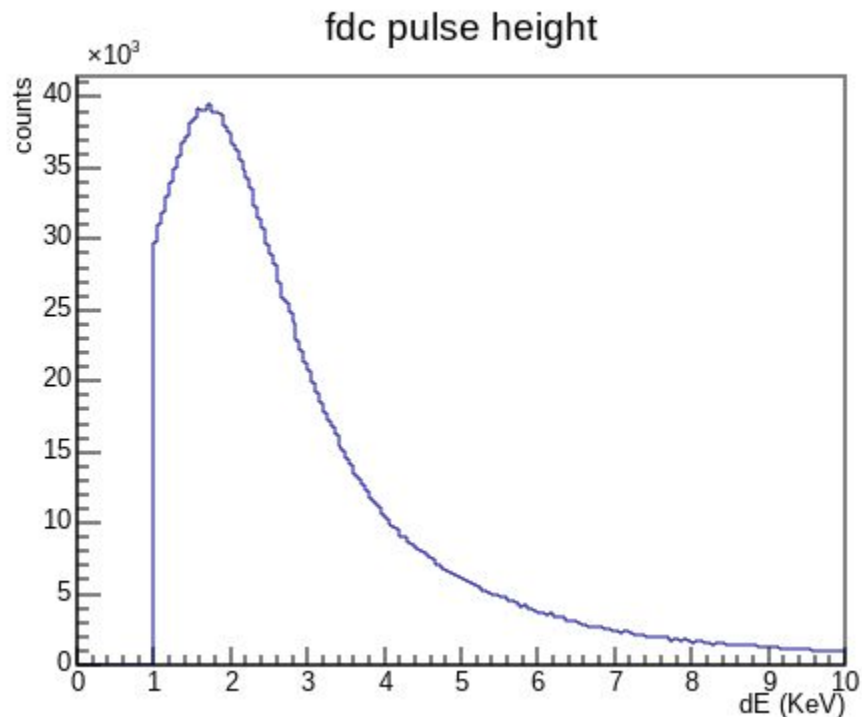
cdc straw hit time



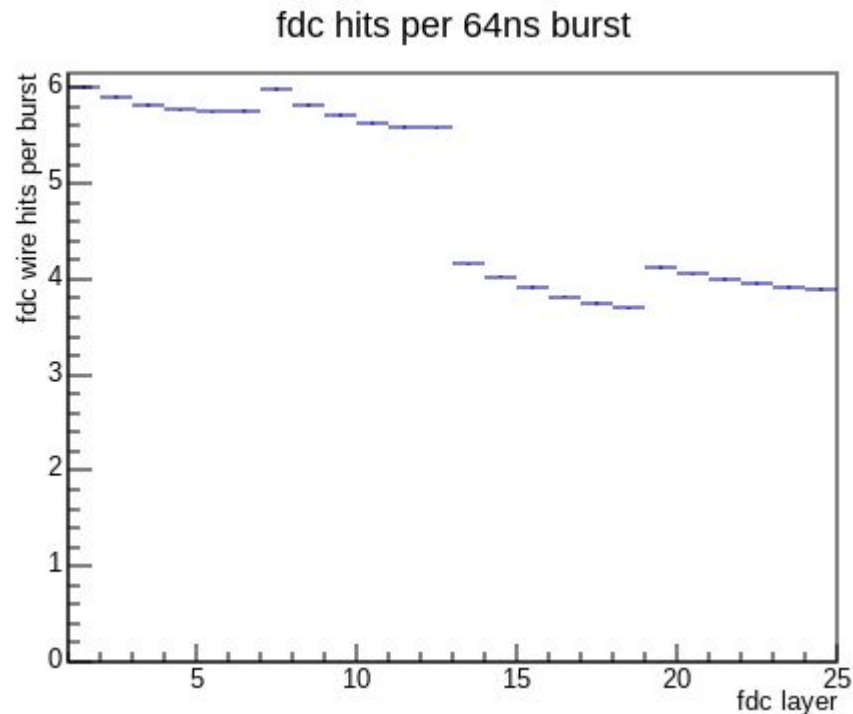
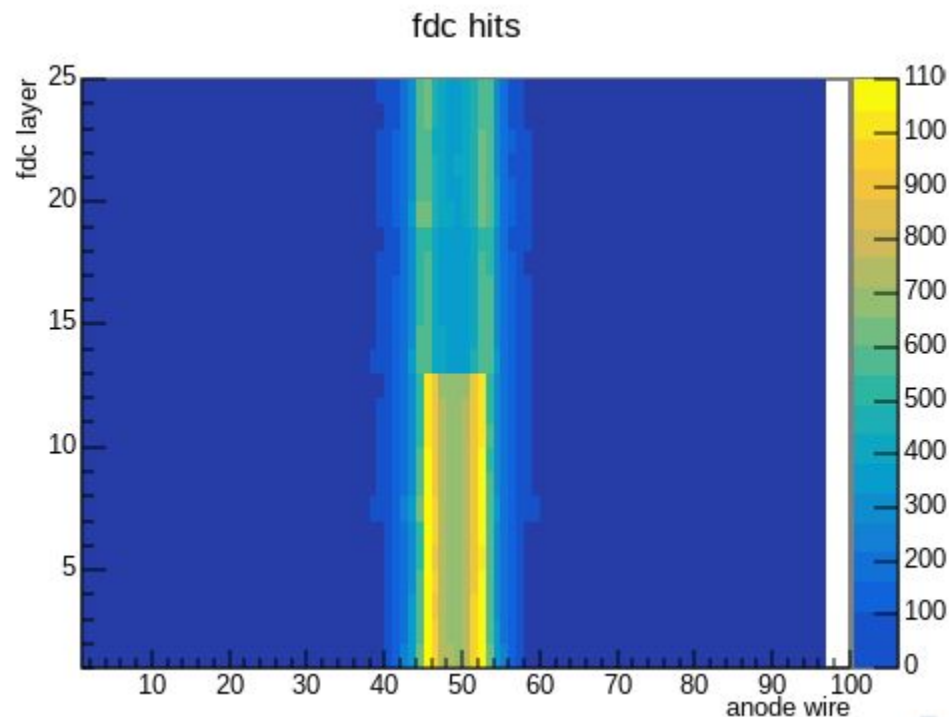
Central drift chamber hits



Forward drift chamber hits

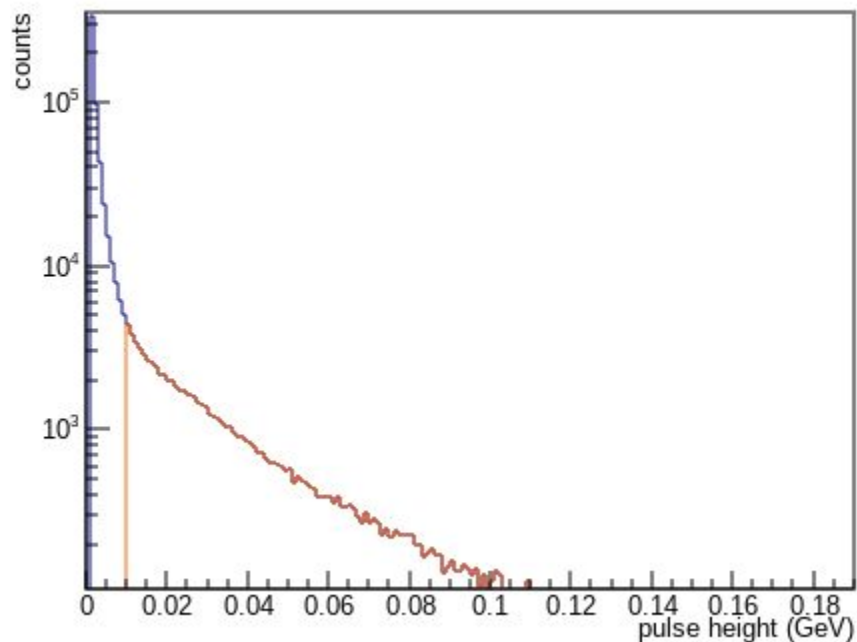


Forward drift chamber hits

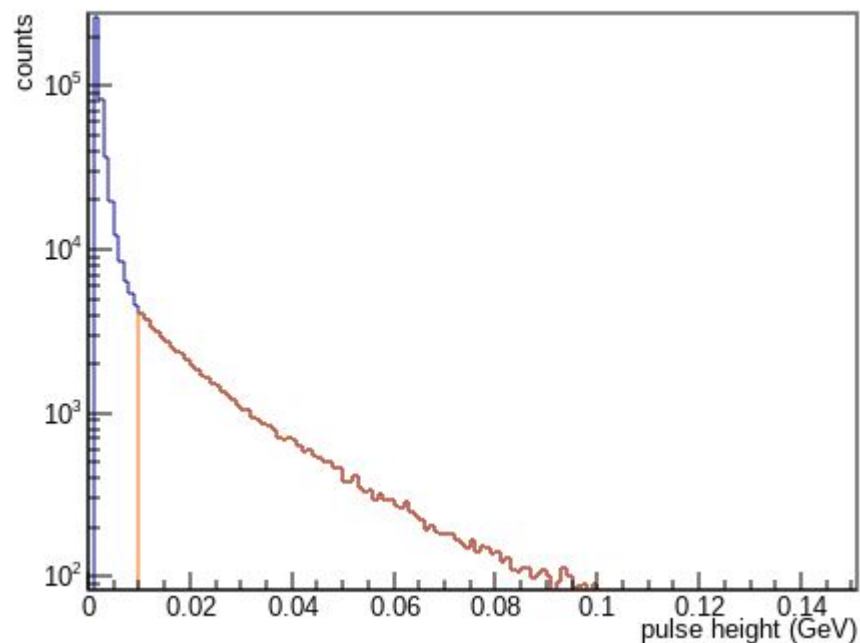


Barrel calorimeter hits

upstream bcal pulse height

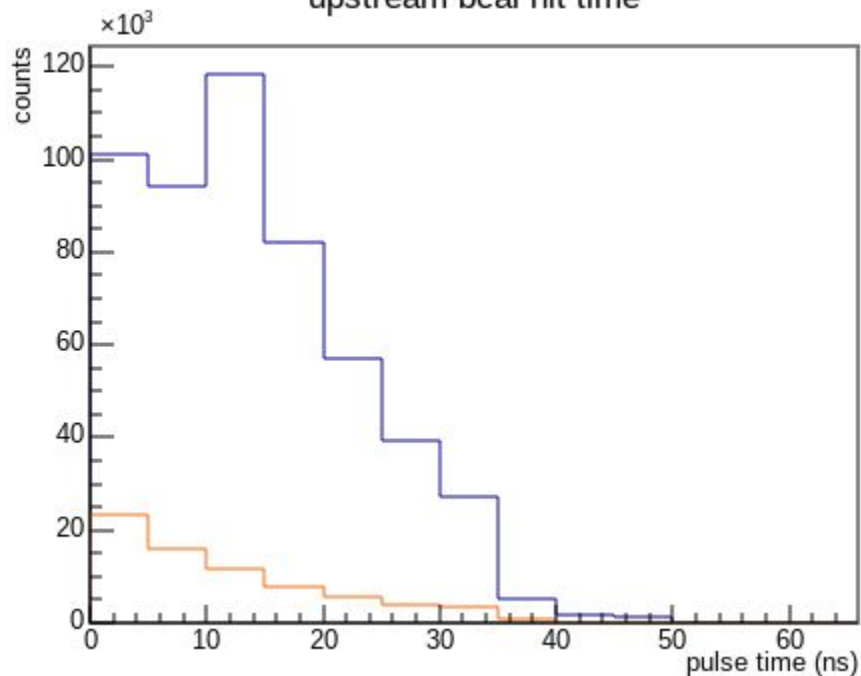


downstream bcal pulse height

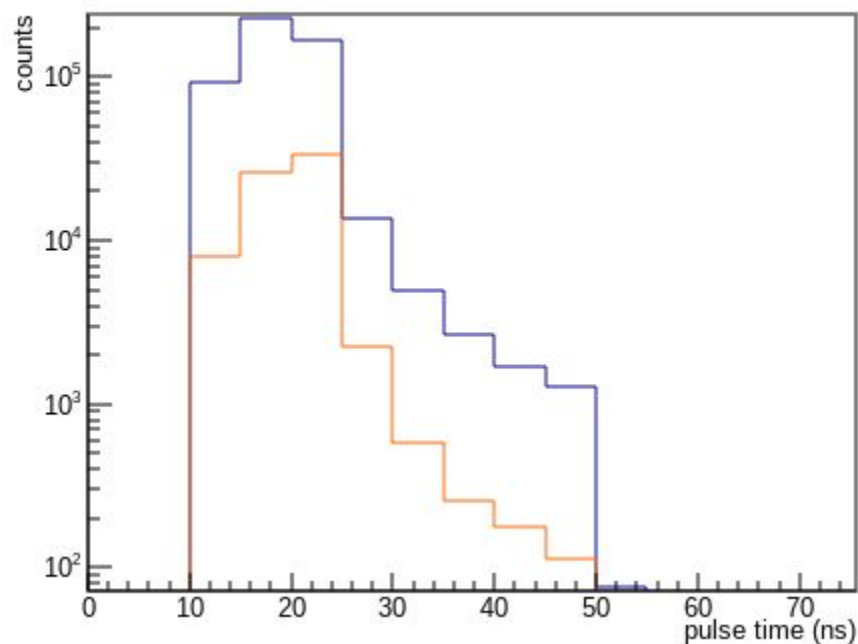


Barrel calorimeter hits

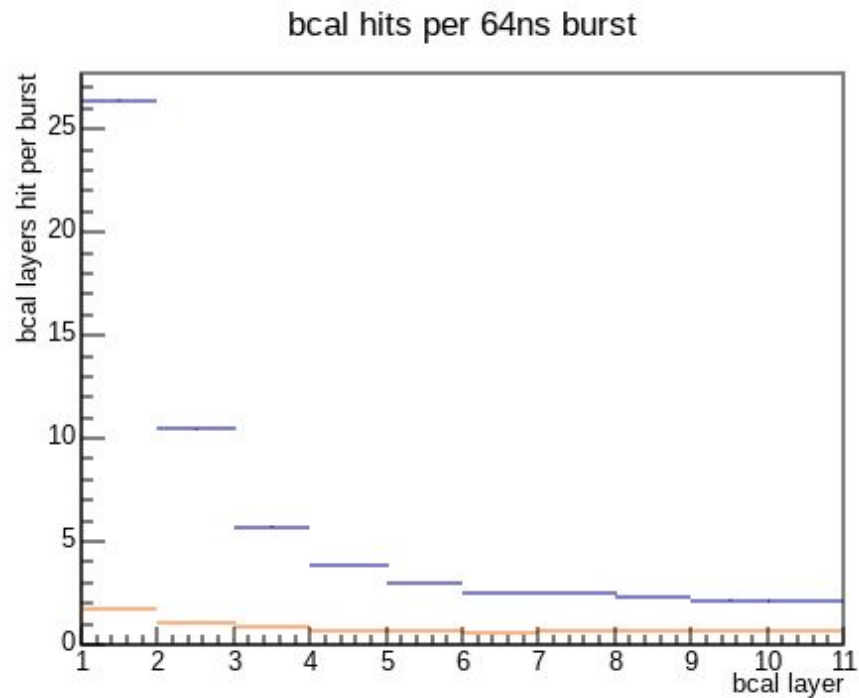
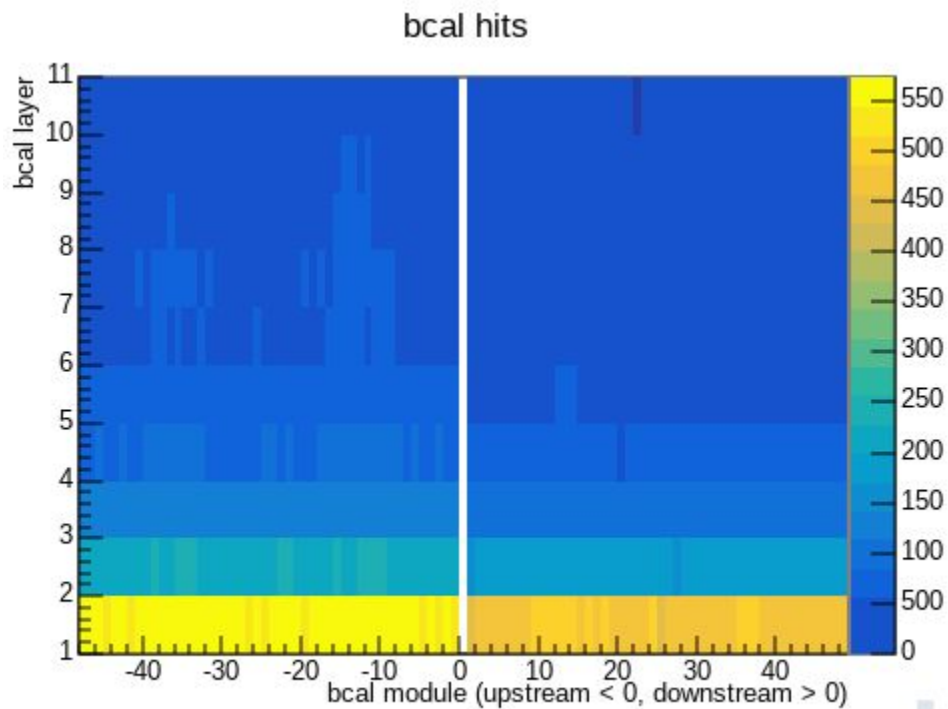
upstream bcal hit time



downstream bcal hit time

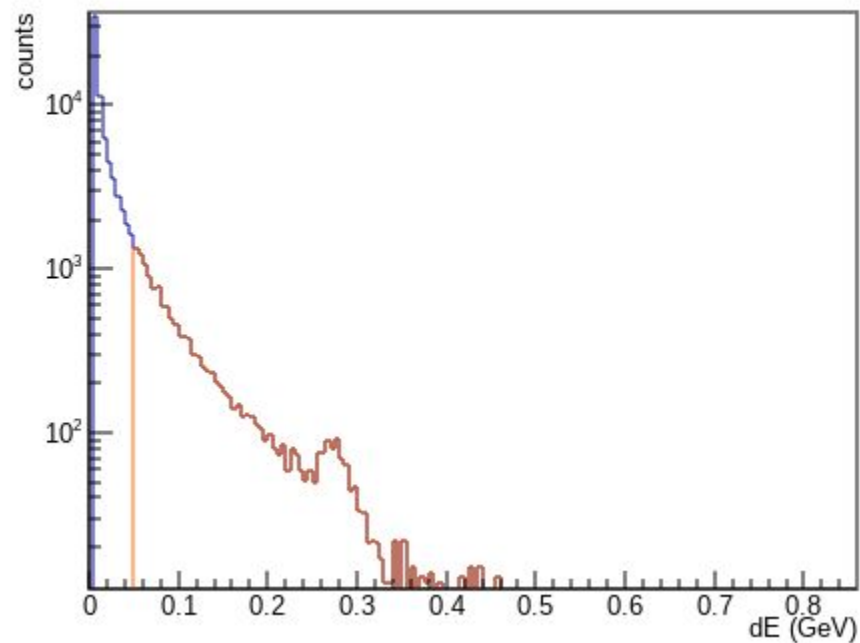


Barrel calorimeter hits

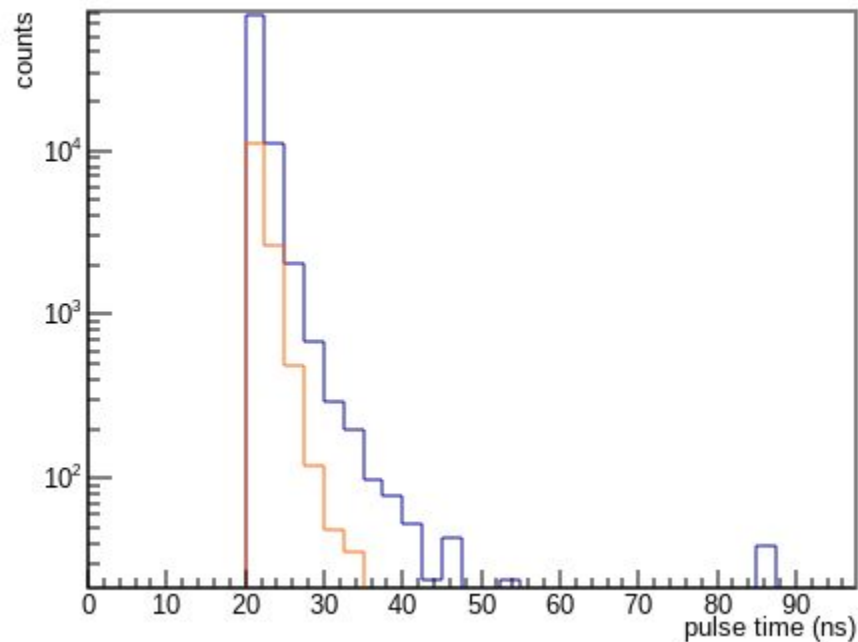


Forward calorimeter hits

fcsl pulse height

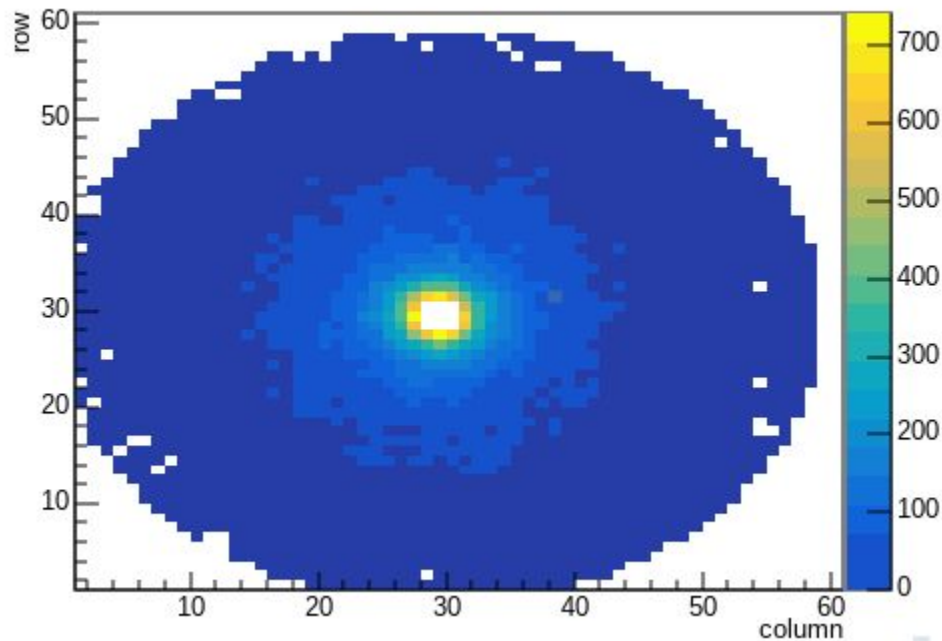


fcsl block hit time

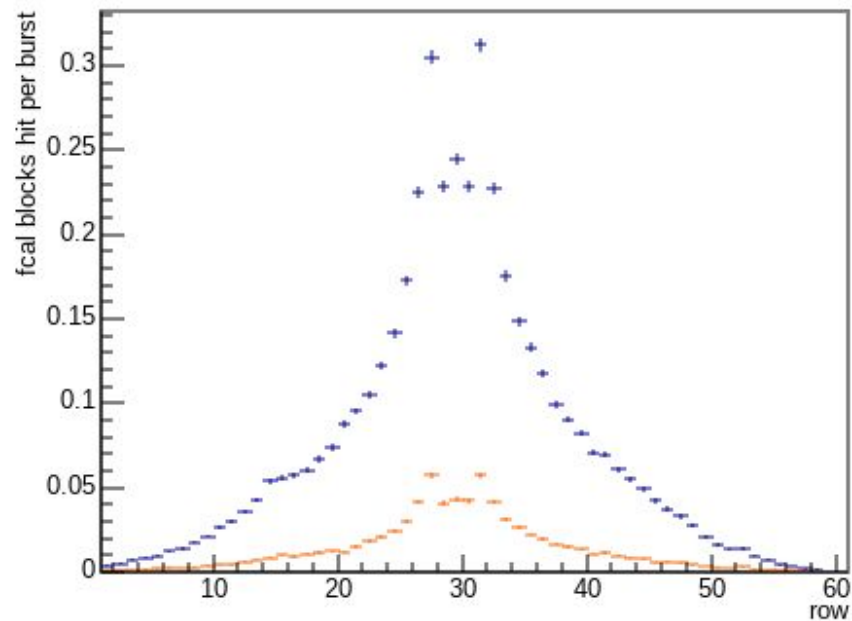


Forward calorimeter hits

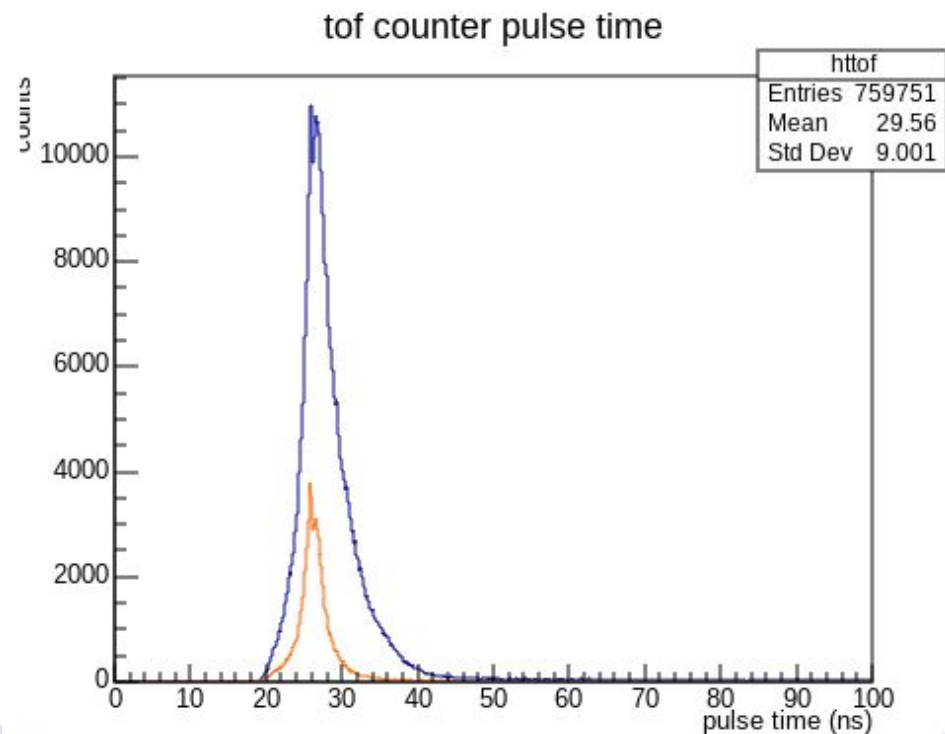
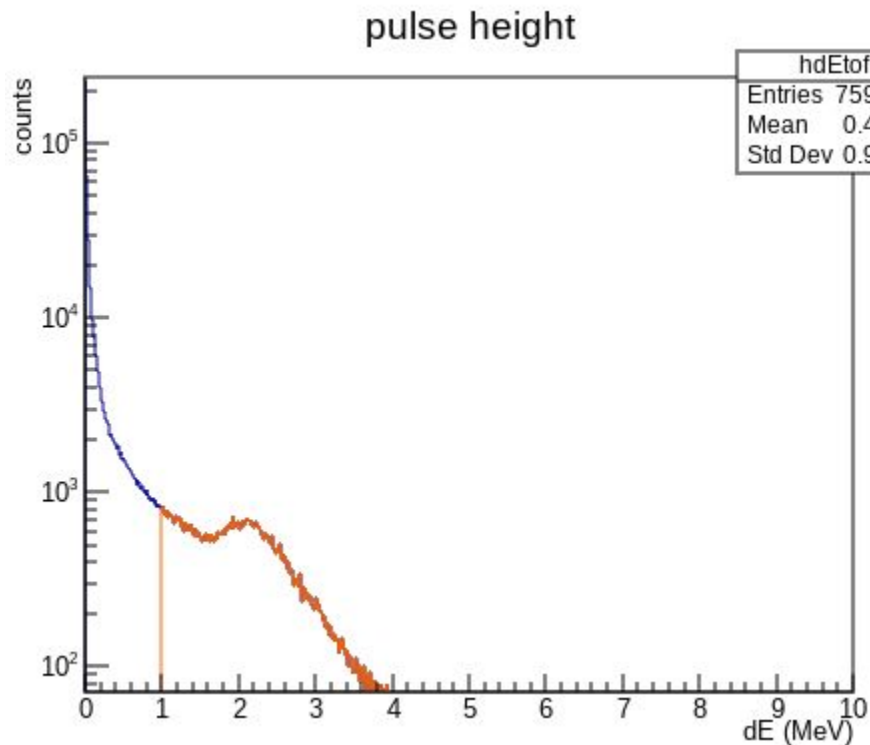
fcal hits



fcal hits per 64ns burst



Forward time-of-flight hits



Forward time-of-flight hits

