I have been adding plots of photon arrival times at the photodetectors into Resolution.C in my repository https://github.com/saraheno/DualTestBeam. This required some changes to DualCrystCalorimeterHit.h and DualCrysCalorimeterSDAction.cpp The SLAC group wants this to study front end electronics (Gonski, Schartzman).

I have a preliminary version in. There are 2 setups of plots, one with a timescale from 0 to 40 ns, the other with 0 to 400 ns. Right now I have memory problems if I try to make one histogram with enough bins to see fine structure at the beginning of the pulse and the full pulse shape. This may take a while to solve.

```
std::cout<<"warning warning if you change the timing histograms, please read the comment in the code"<<std::endl;
TH1F *eecalpd1scint = new TH1F("eecalpd1scint","electron scint photon arrival time ns ECAL PD1",finenbin,timemin,timemax);
TH1F *eecalpd1cer = new TH1F("eecalpd1cer","electron cerenov photon arrival time ns ECAL PD1",finenbin,timemin,timemax);
TH1F *pecalpd1scint = new TH1F("pecalpd1scint","pion scint photon arrival time ns ECAL PD1",finenbin,timemin,timemax);
TH1F *pecalpd1cer = new TH1F("pecalpd1cer","pion cerenov photon arrival time ns ECAL PD1",finenbin,timemin,timemax);
TH1F *eecalpd2scint = new TH1F("eecalpd2scint","electron scint photon arrival time ns ECAL PD2",finenbin,timemin,timemax);
TH1F *eecalpd2cer = new TH1F("eecalpd2cer","electron cerenov photon arrival time ns ECAL PD2",finenbin,timemin,timemax);
TH1F *pecalpd2scint = new TH1F("pecalpd2scint","pion scint photon arrival time ns ECAL PD2",finenbin,timemin,timemax);
TH1F *pecalpd2cer = new TH1F("pecalpd2cer","pion cerenov photon arrival time ns ECAL PD2",finenbin,timemin,timemax);
TH1F *ehcalpd1scint = new TH1F("ehcalpd1scint","elec scint photon arrival time ns HCAL scint fiber",finenbin,timemin,timemax);
TH1F *ehcalpd1cer = new TH1F("ehcalpd1cer","elec cerenov photon arrival time ns HCAL scint fiber",finenbin,timemin,timemax);
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TH1F *ehcalpd2scint = new TH1F("ehcalpd2scint","elec scint photon arrival time ns HCAL quartz fiber",finenbin,timemin,timemax);
TH1F *ehcalpd2cer = new TH1F("ehcalpd2cer","elec cerenov photon arrival time ns quartz fiber",finenbin,timemin,timemax);
TH1F *phcalpd2scint = new TH1F("phcalpd2scint","pion scint photon arrival time ns quartz fiber",finenbin,timemin,timemax);
TH1F *phcalpd2cer = new TH1F("phcalpd2cer","pion cerenov photon arrival time ns quartz fiber",finenbin,timemin,timemax);

TH1F *eecalpd1scintz = new TH1F("eecalpd1scintz","electron scint photon arrival time ns ECAL PD1",finenbin,timemin,timemaxz);
TH1F *eecalpd1cerz = new TH1F("eecalpd1cerz","electron cerenov photon arrival time ns ECAL PD1",finenbin,timemin,timemaxz);
TH1F *pecalpd1scintz = new TH1F("pecalpd1scintz","pion scint photon arrival time ns ECAL PD1",finenbin,timemin,timemaxz);
TH1F *pecalpd1cerz = new TH1F("pecalpd1cerz","pion cerenov photon arrival time ns ECAL PD1",finenbin,timemin,timemaxz);
TH1F *eecalpd2scintz = new TH1F("eecalpd2scintz","electron scint photon arrival time ns ECAL PD2",finenbin,timemin,timemaxz);
TH1F *eecalpd2cerz = new TH1F("eecalpd2cerz","electron cerenov photon arrival time ns ECAL PD2",finenbin,timemin,timemaxz);
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TH1F *ehcalpd2cerz = new TH1F("ehcalpd2cerz","elec cerenov photon arrival time ns quartz fiber",finenbin,timemin,timemaxz);
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TH1F *phcalpd2cerz = new TH1F("phcalpd2cerz","pion cerenov photon arrival time ns quartz fiber",finenbin,timemin,timemaxz);
```
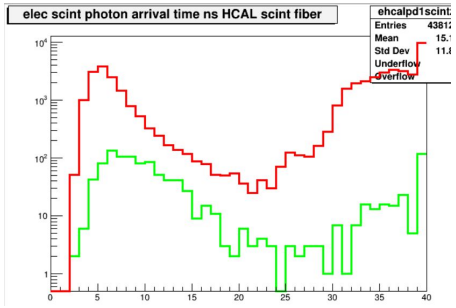
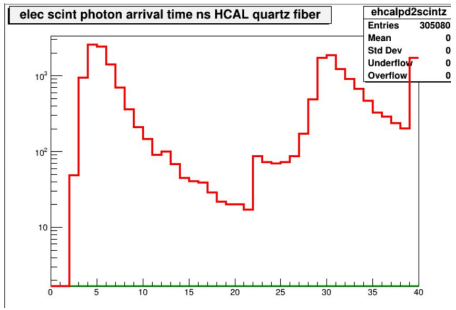
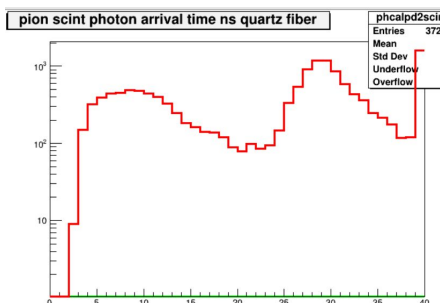
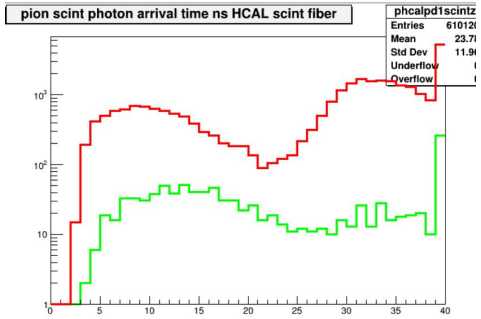
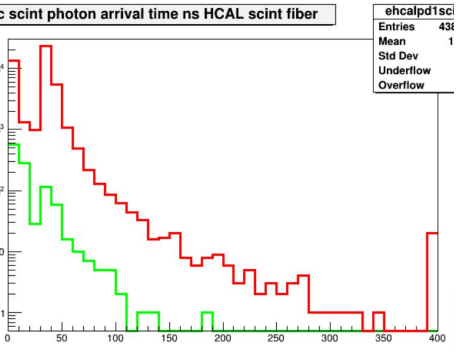

Plots for FSCEPonly. Note that a fiber is 12(?) (7 at speed of light) ns long

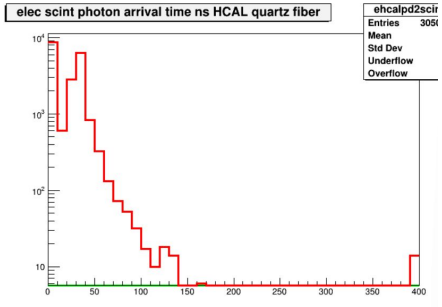


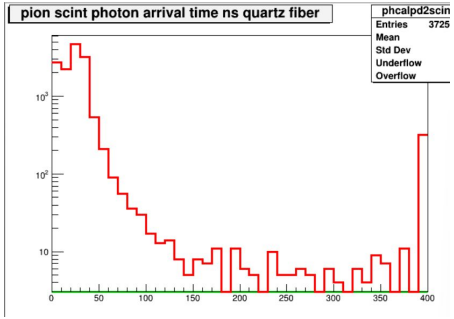


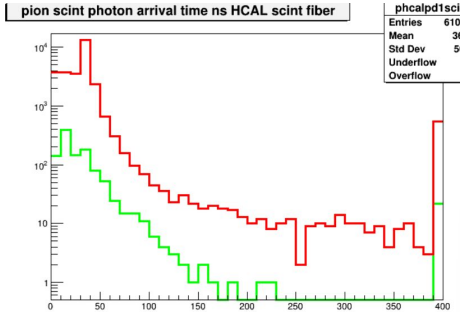












Red is cherenkov light

Green is scint light (scaled down during the generation to save time

There is no scint light in quartz fibers