IFIC group “week” report

Pablo F. – IFIC & CSIC
2018/09/11

ProtoDUNE-SP – hardware

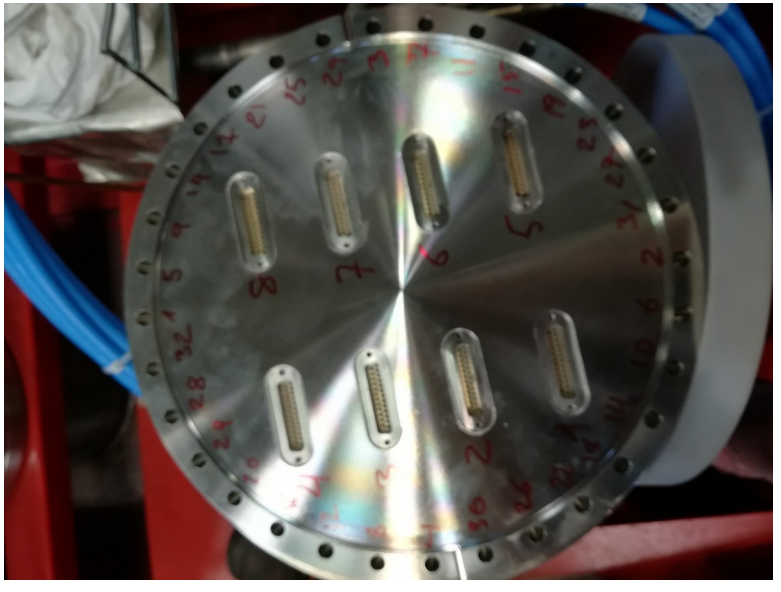
Successful installation of the T-gradient(s)

ProtoDUNE-SP – hardware

Successful installation of the T-gradient(s)

Final soldering of the RTD cables to the flanges of top of the cryostat
Closing of the flanges just before start filling
Two of our flanges had leaks:

- Redo a complete flange, the leak was mended
- Put a jacket around the other flange with leak (T-gradient), due to its complex layout

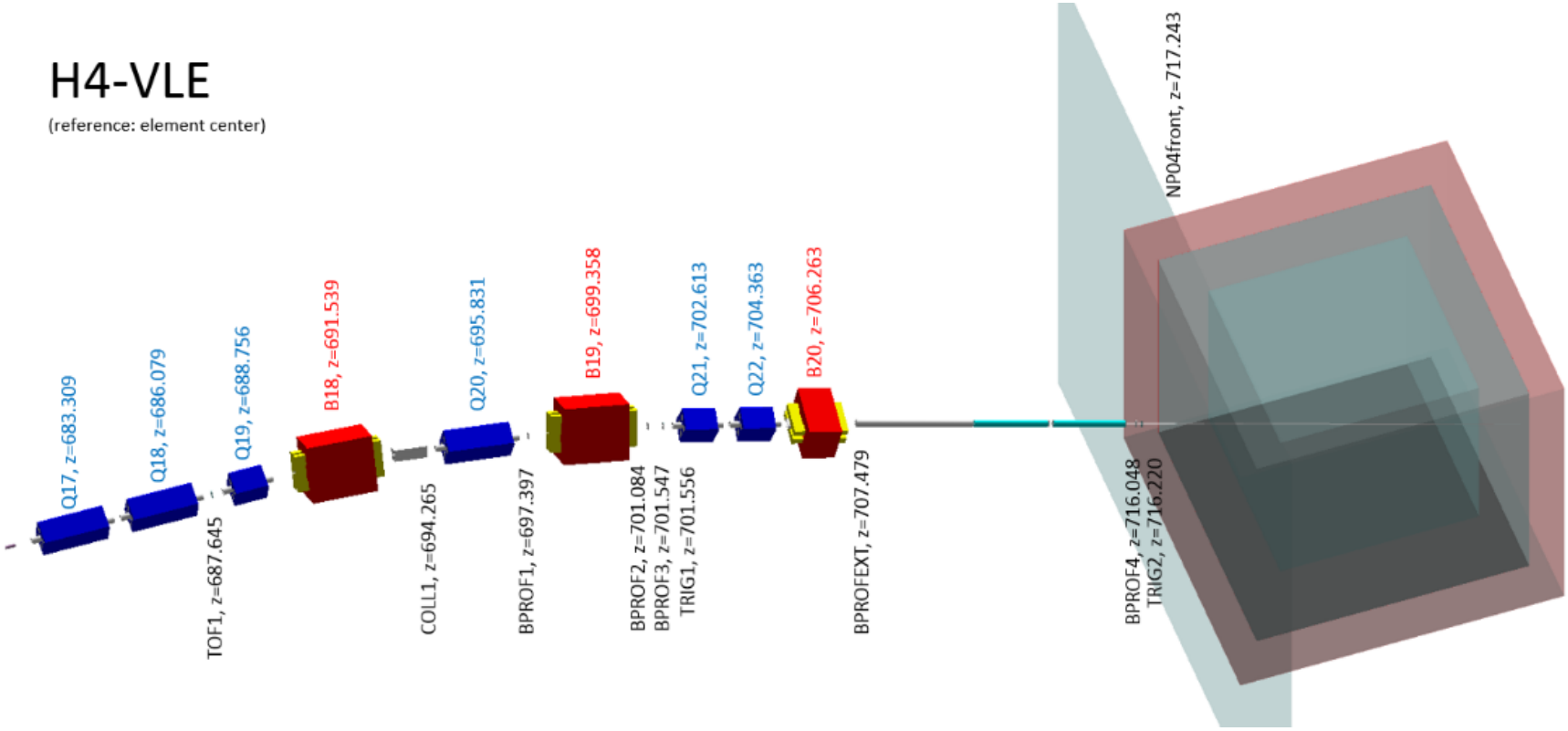


ProtoDUNE-SP – hardware

Redo the roof sensor (which broke again just before the closing) and replace broken sensors on the floor

ProtoDUNE-SP – software

Finished including the beam instruments into larsoft for analysis and the beam-TPC matching for MC11 (mid August)



ProtoDUNE-SP – software

In the absence of simulated beam instruments, I have smeared the MC for each of the monitors according to the most realistic expectations (adjustable from fcl file)

- position: ~1/sqrt(12) mm
- time: ~1 ns
- Čerenkovs: ~95% efficiency

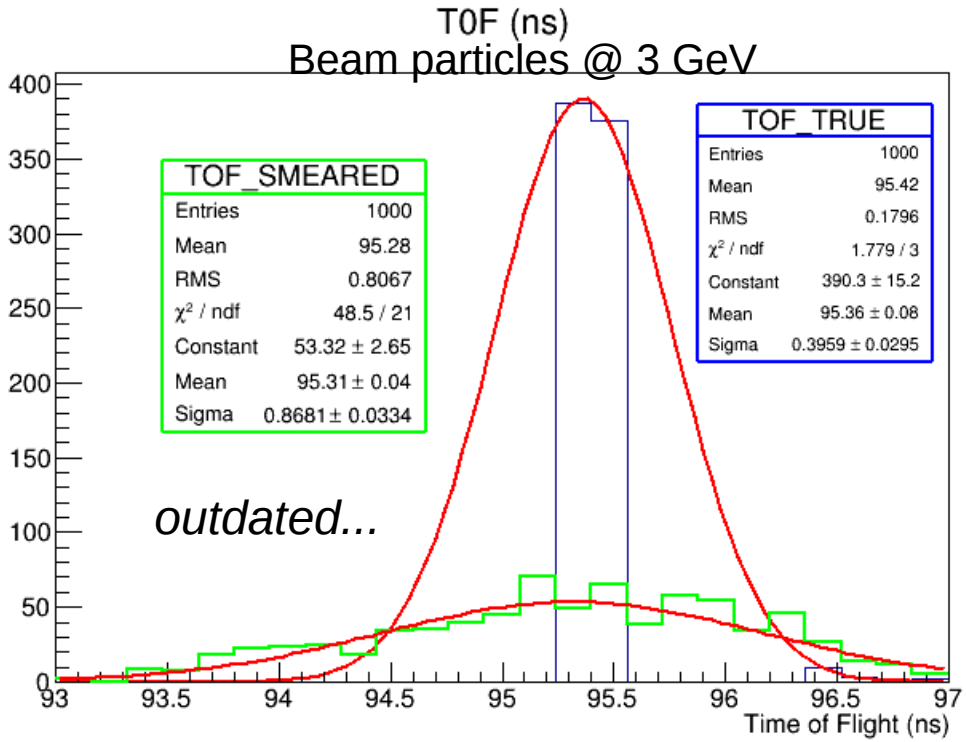
Added the 2 Cherenkov detectors for particle distinction (no MC for them)

```
    if (name == "CHERENKOV1"){
      Float_t Ptot = pow(pow(Px,2)+pow(Py,2)+pow(Pz,2),0.5)/1000.;
      if (Ptot <= 2.0){
        if (abs(PDGid) == 2212 || abs(PDGid) == 310) fSmearedVar1 = 0;
        if (abs(PDGid) == 11) fSmearedVar1 = 1;
        if (abs(PDGid) == 211) fSmearedVar1 = 1;
}
      if (Ptot <= 3.0 && Ptot >2.0){
        if (abs(PDGid) == 2212 || abs(PDGid) == 310) fSmearedVar1 = 0;
```

Examples

```
Particle ID: 211
Cherenkov 1: 1
Cherenkov 2: 1
```

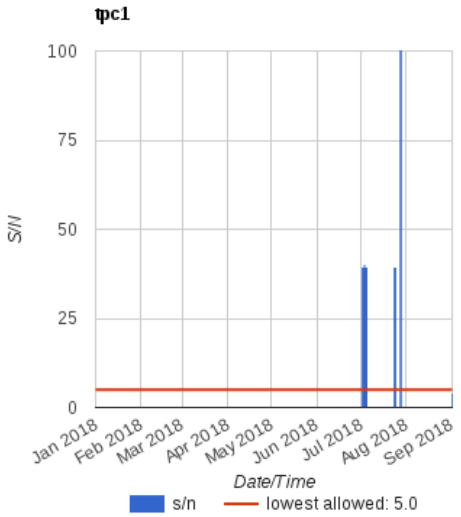
```
Particle ID: 2212
Cherenkov 1: 0
Cherenkov 2: 0
```

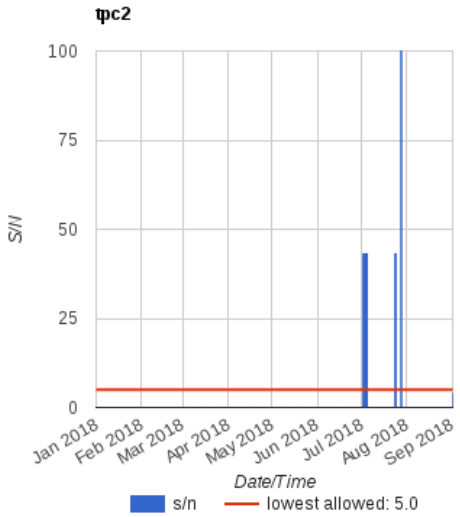


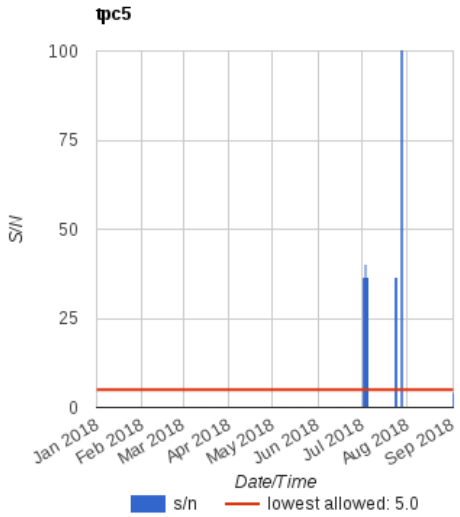
ProtoDUNE-SP – software

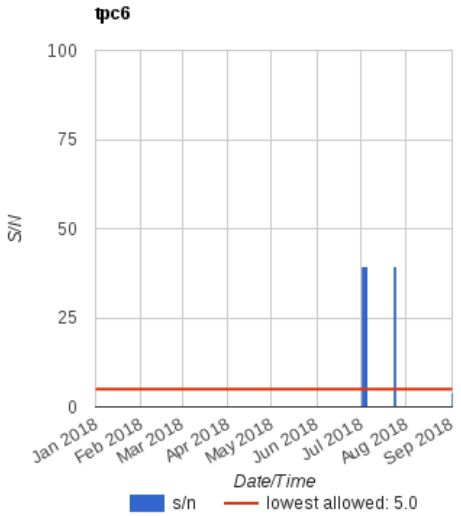
Helping with the development of the DQM tools and onsite expert for this during the upcoming beam shifts

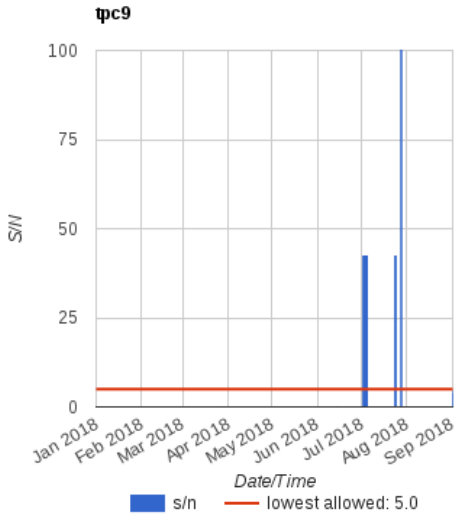
S/N plots by APA

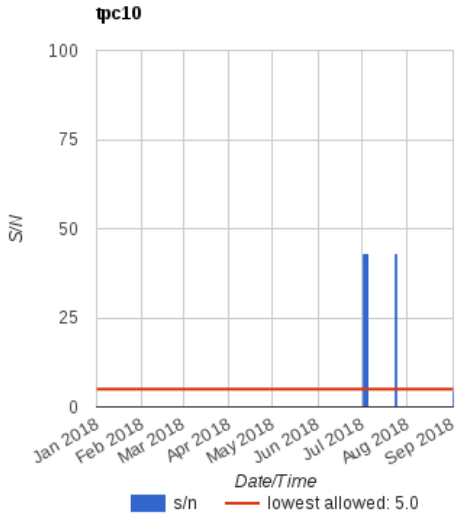








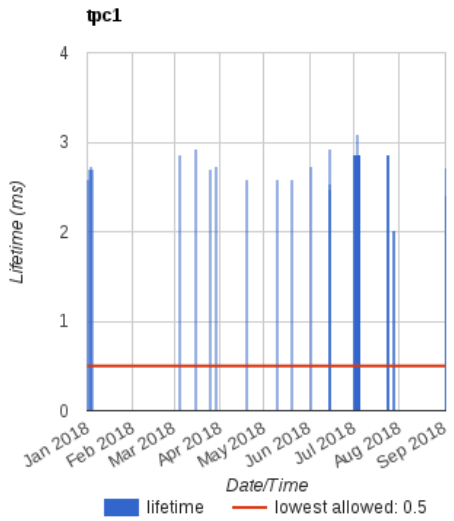


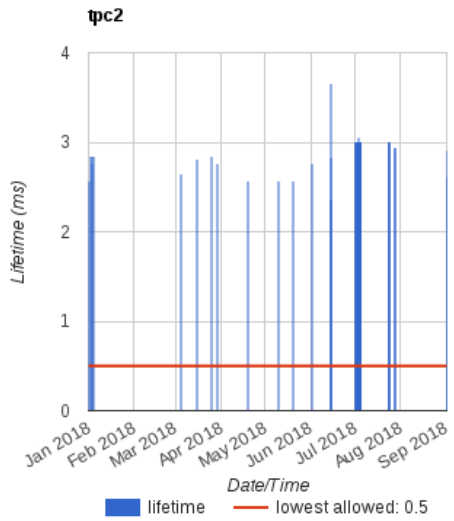


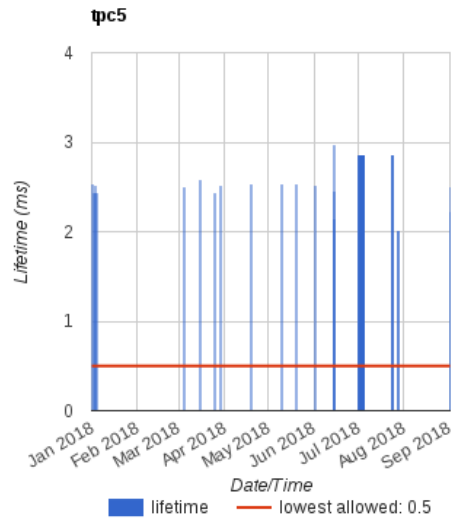
ProtoDUNE-SP – software

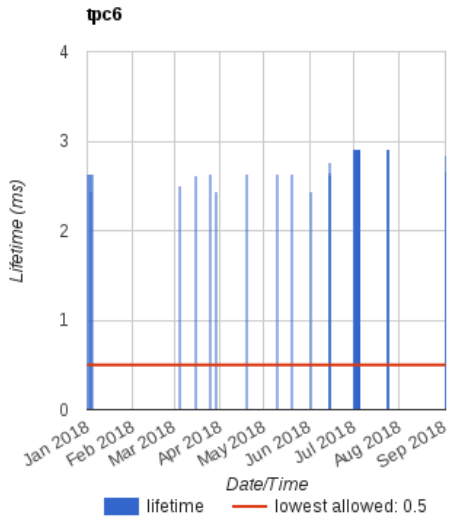
Helping with the development of the DQM tools and onsite expert for this during the upcoming beam shifts

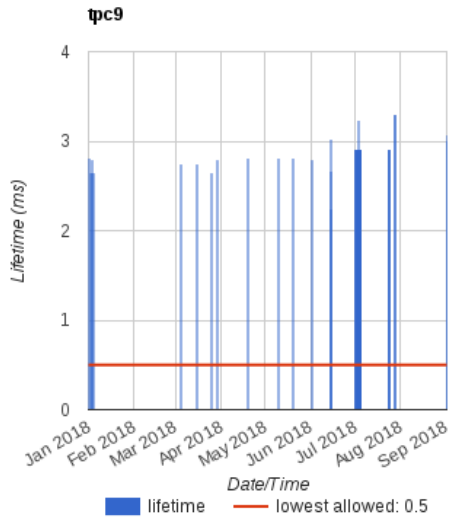
Purity plots by APA

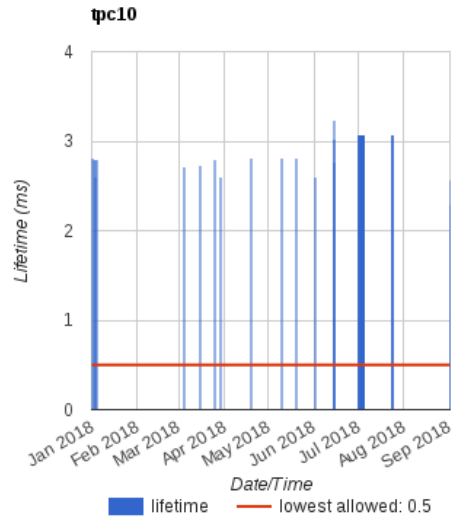












SuperK atm. – software +...

[Hybrid analysis is the analysis combining the single-ring neutron-tagging-driven sample selection and the addition of the TauNN binning

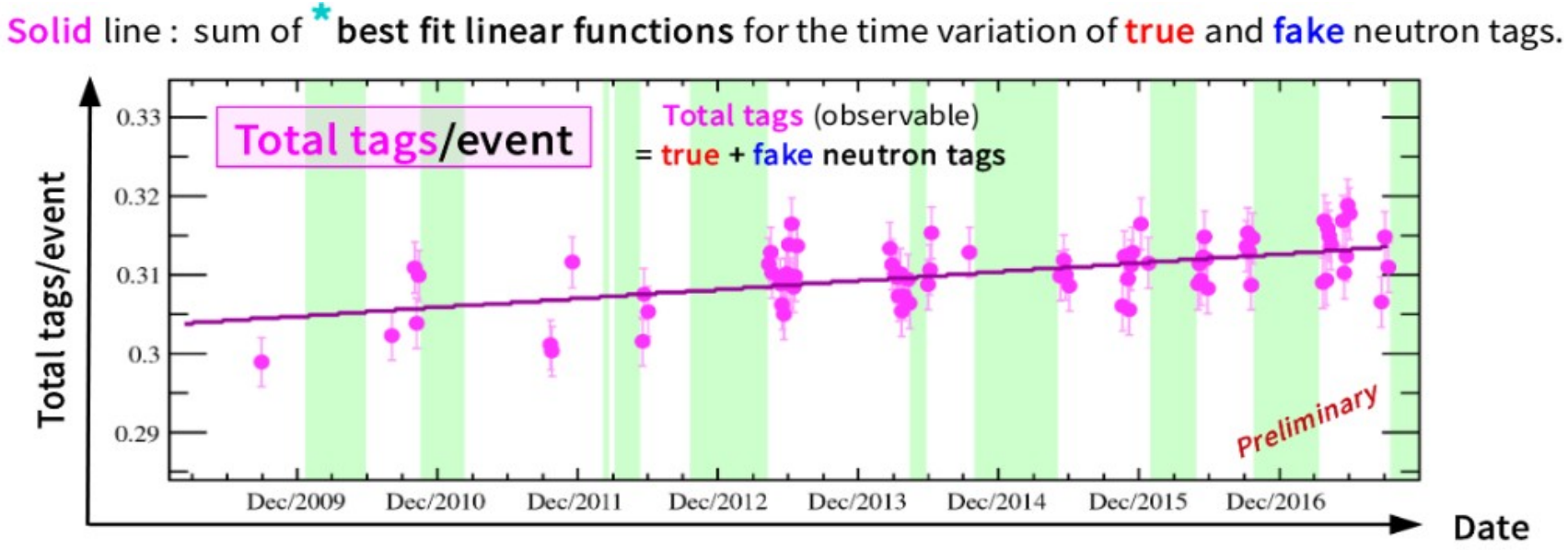
- The neutron sample selection is only applied for SK-IV (main impact on CP phase)

- The Tau NN is applied for all SK phases (main impact on MH)]

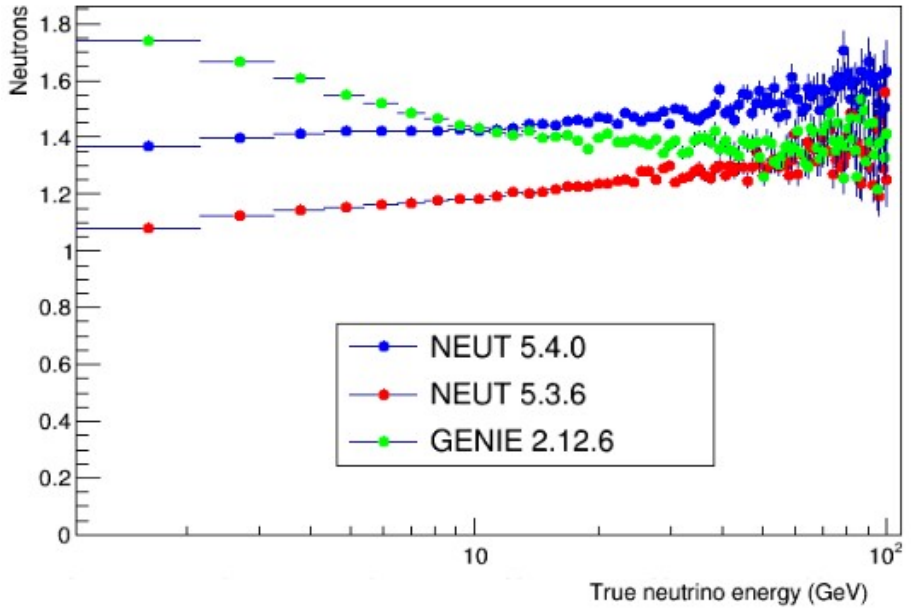
Updated the code to the latest libraries and modified it to include two more systematic errors related with the neutron tagging (three in total)

SuperK atm. – software +...

PMT-gain variation:



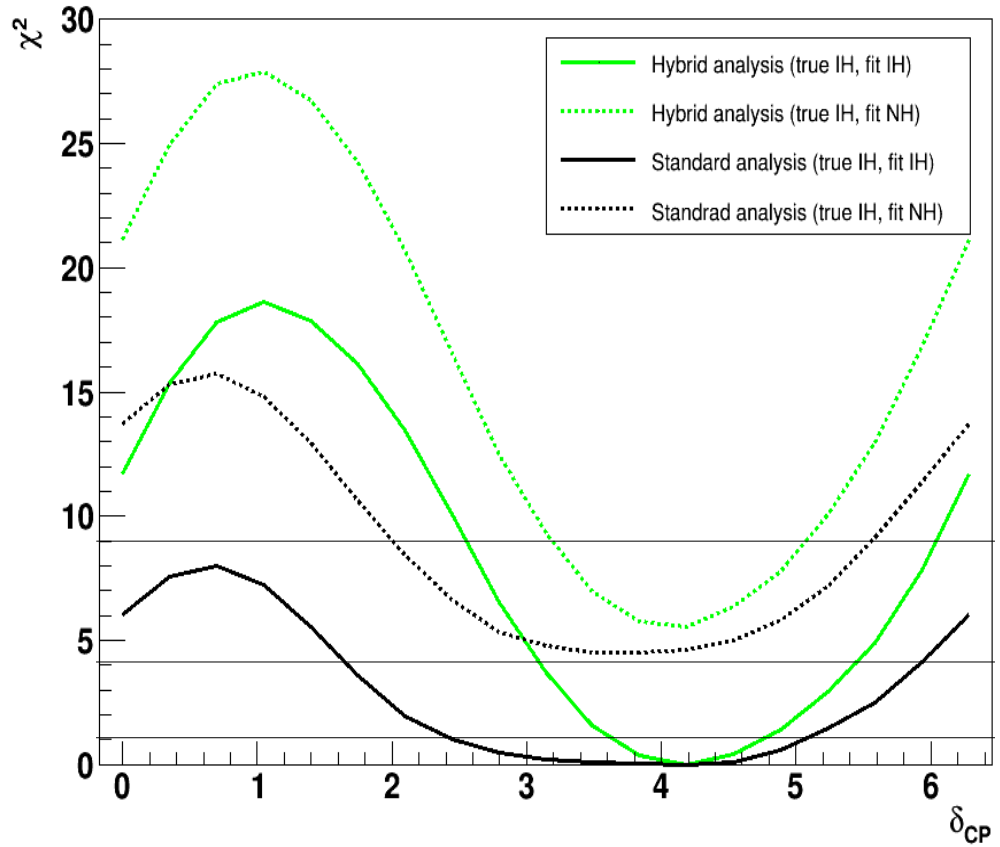
Neutrino interaction generators:



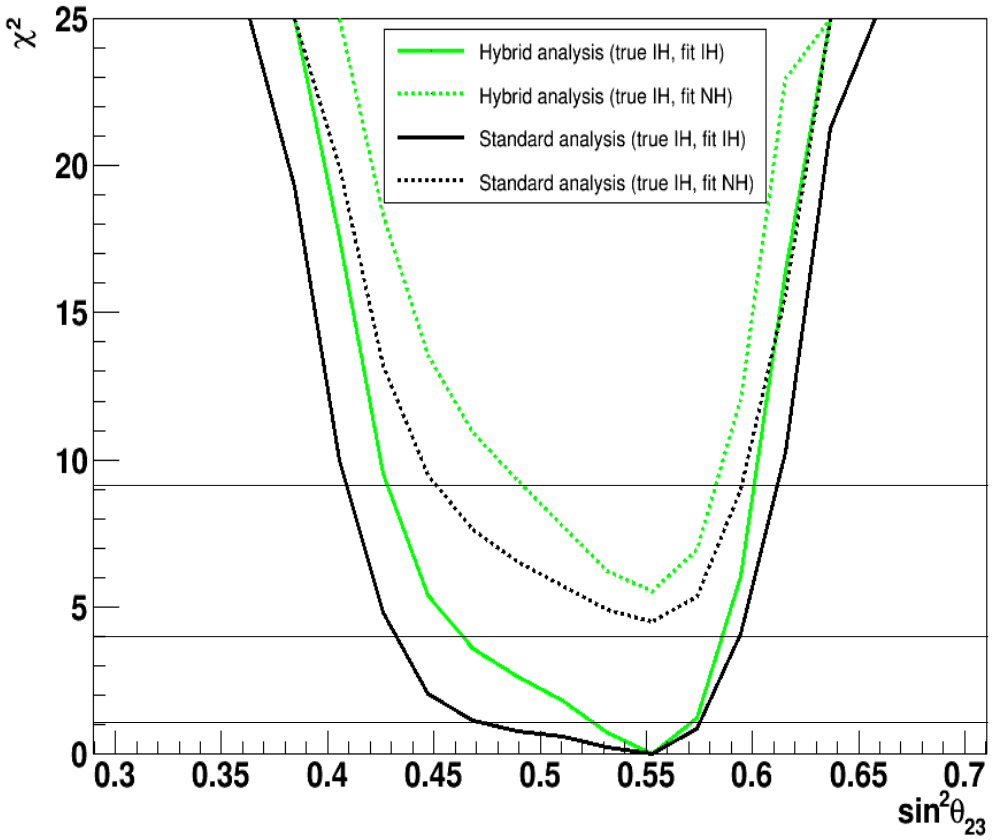
SuperK atm. – software +...

Some plots comparing standard and hybrid SK analyses.
No systematics and SK livetime

True IH

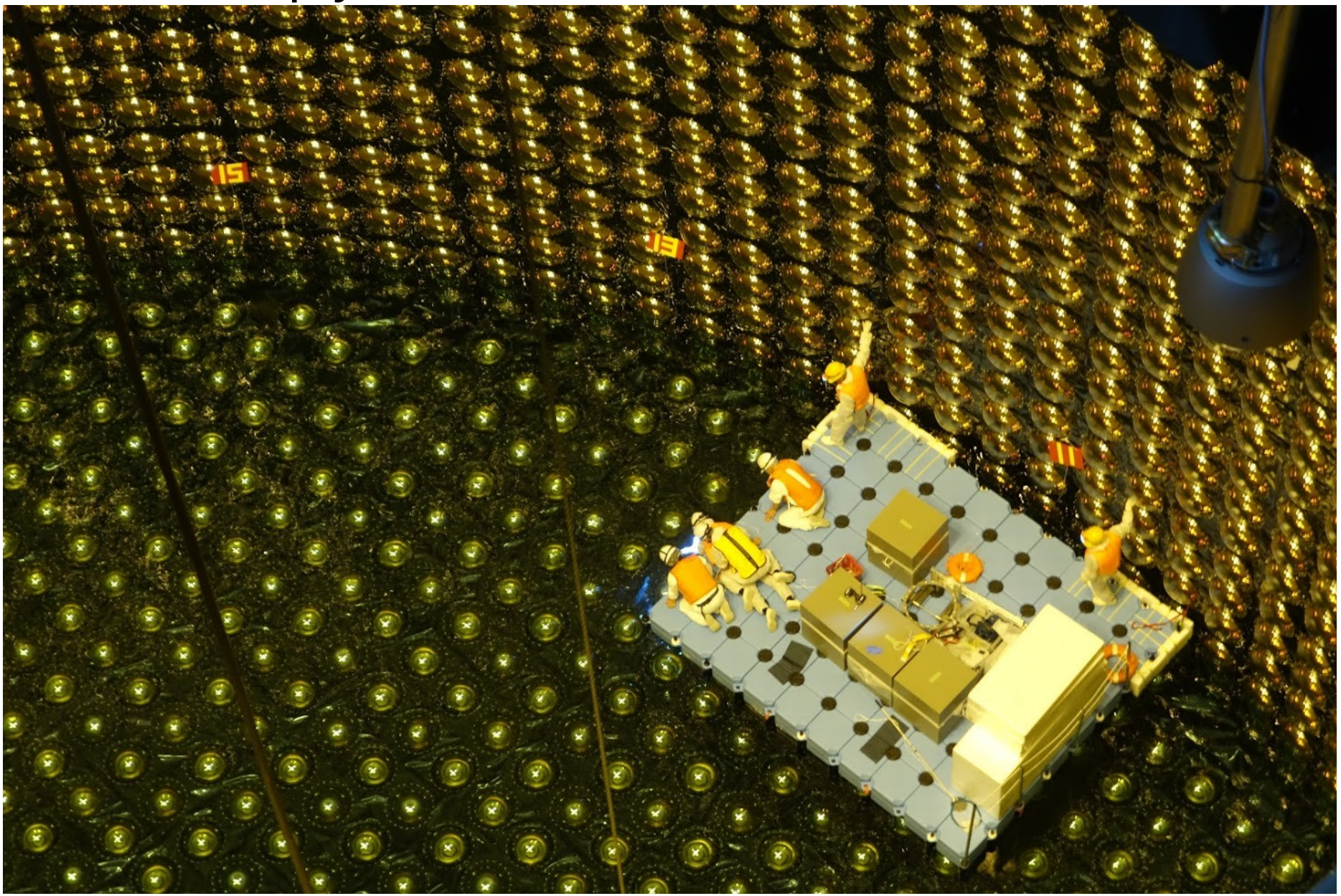


True IH



SuperK atm. – software +...

SK tank is empty



SuperK atm. – software +...

SK tank is empty