

HRS CHERENKOV STUDY

Shujie Li

The Cherenkov Effect

- Threshold of Cherenkov radiation: $\beta c \geq \frac{c}{n}$
- HRS Cherenkov Chambers use 1atm CO₂ :

[K. Slifer, E94010 tech note 32]

$$n = 1.00041$$

$$p_{\min,e} = 17.85 \text{ MeV}/c$$

$$p_{\min,\pi} = 4.87 \text{ GeV}/c$$

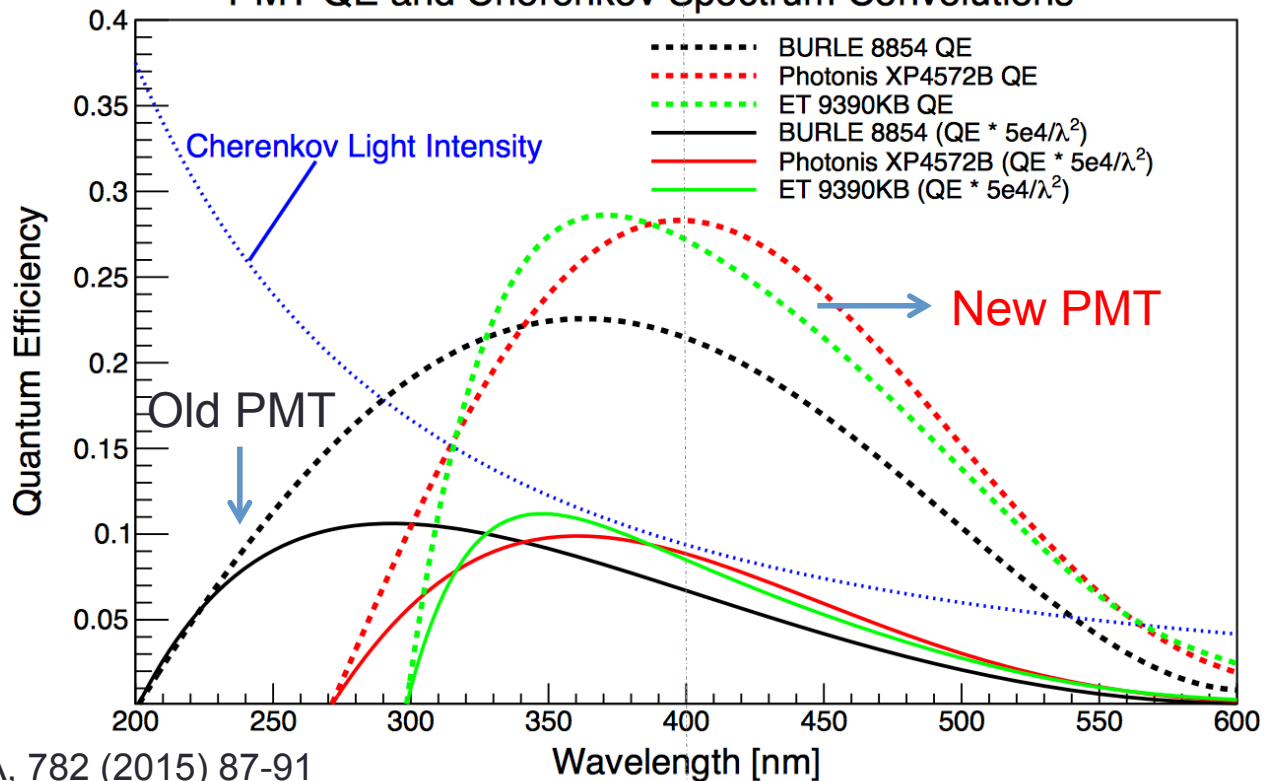
Cherenkov Chamber Status

Upgraded Cherenkov
in DVCS/GMP:

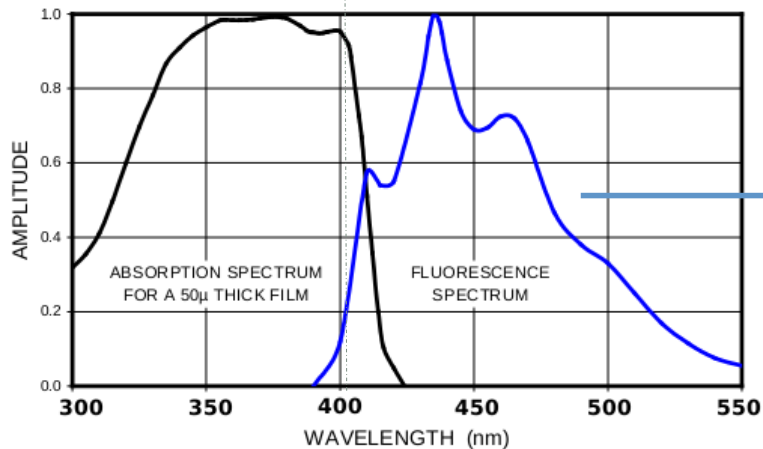
- Extended LHRS Cherenkov depth from 100cm to 128cm. (right arm = 137cm unchanged)
- New PMTs with wavelength shift (WLS) paint



PMT QE and Cherenkov Spectrum Convolutions

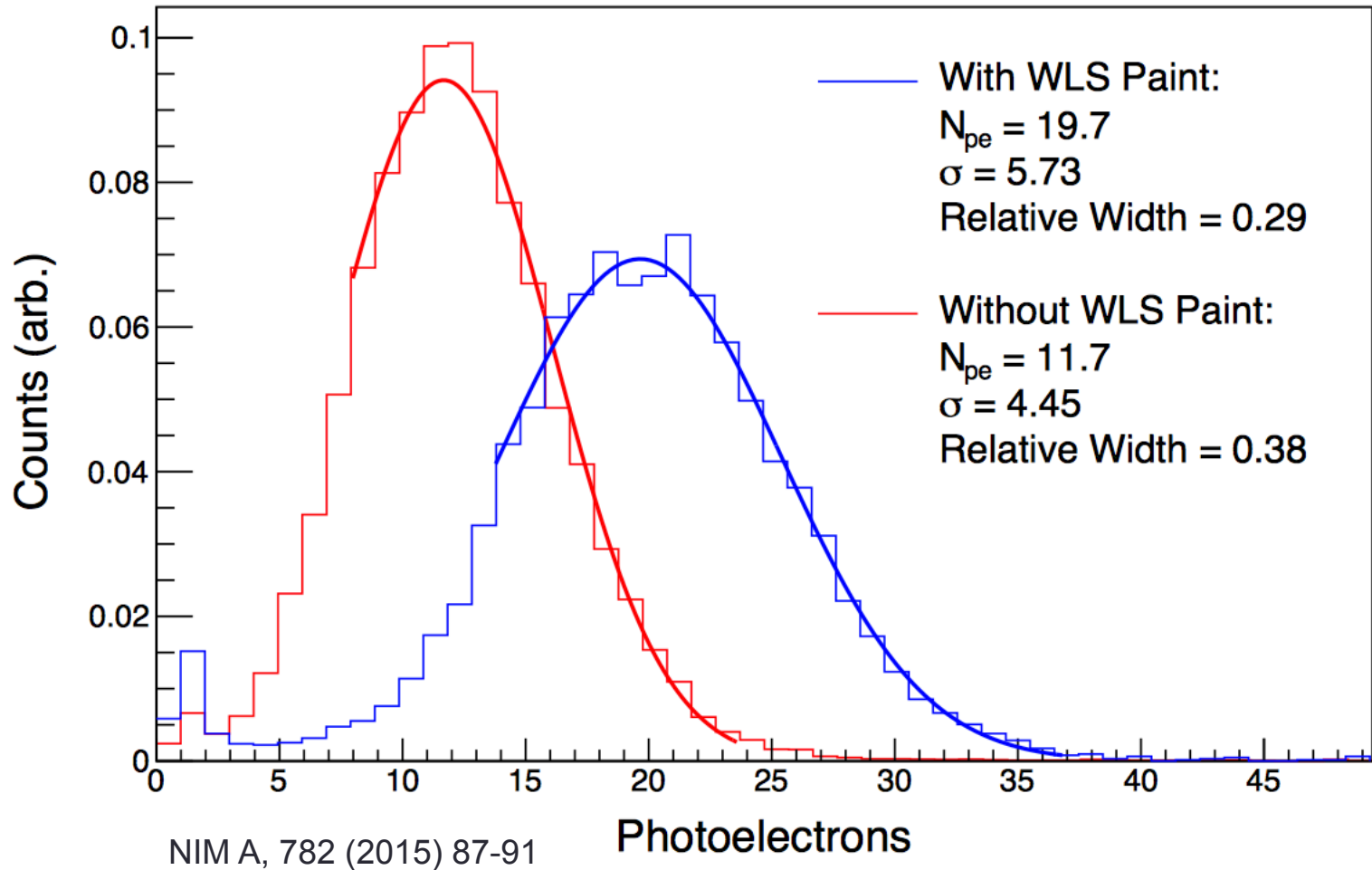


NIM A, 782 (2015) 87-91



WLS paint shifts Cherenkov photons to larger wavelength

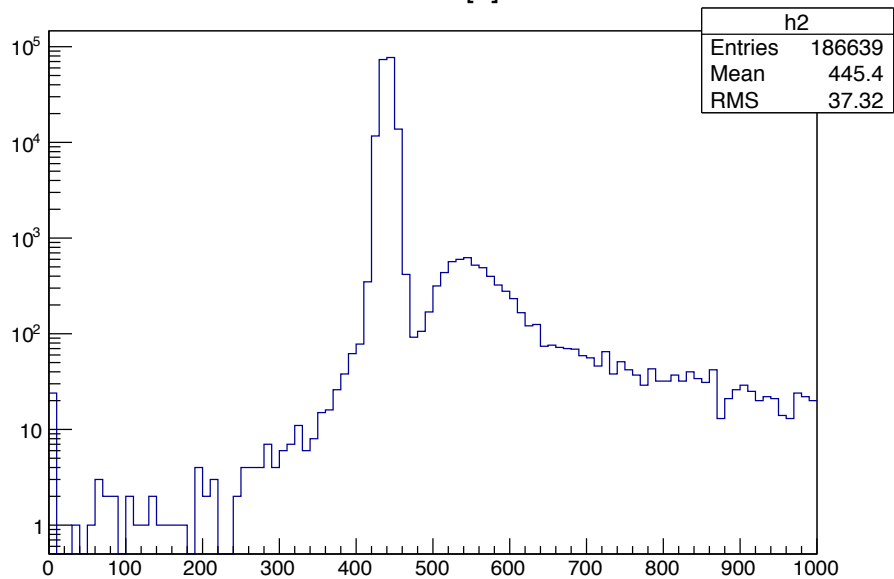
RHRS Gas Cherenkov PMT #5:Full Light Cone



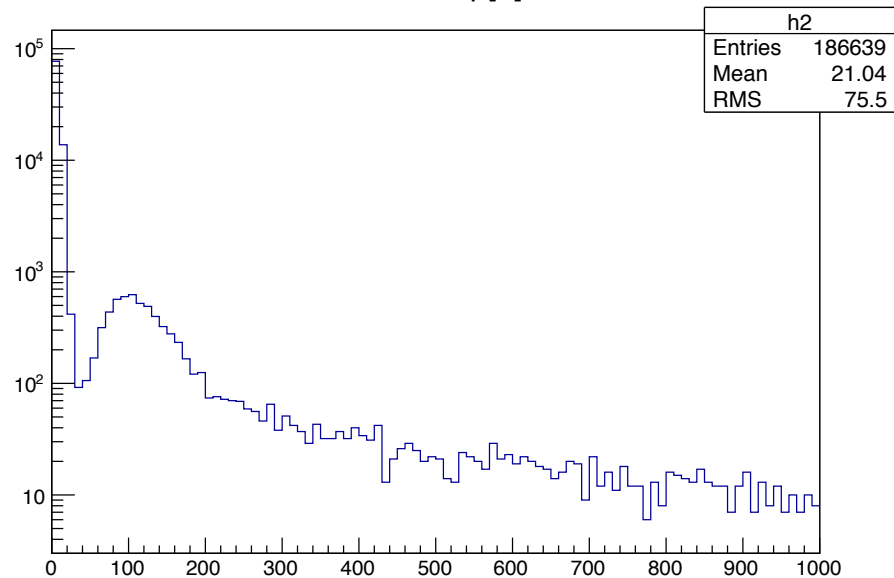
Calibration

right_gmp_23128.root

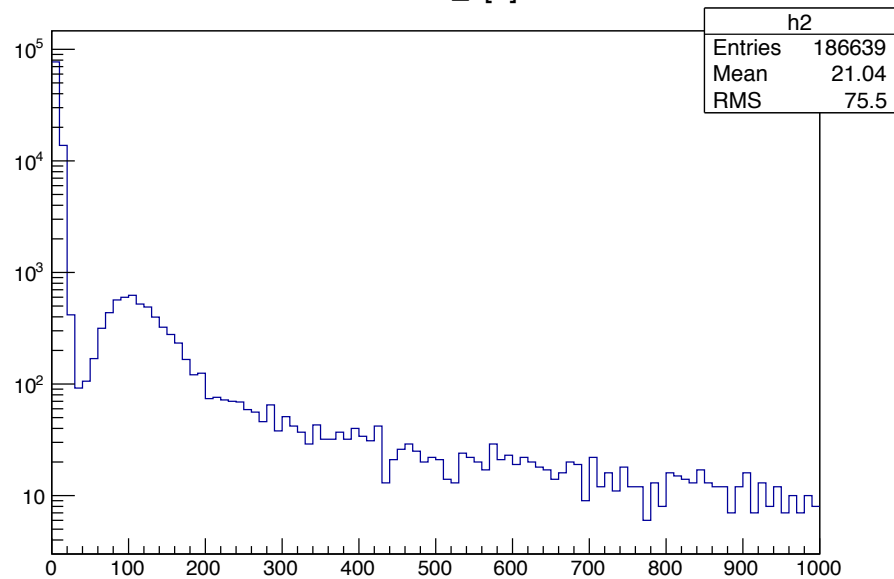
R.cer.a[0]



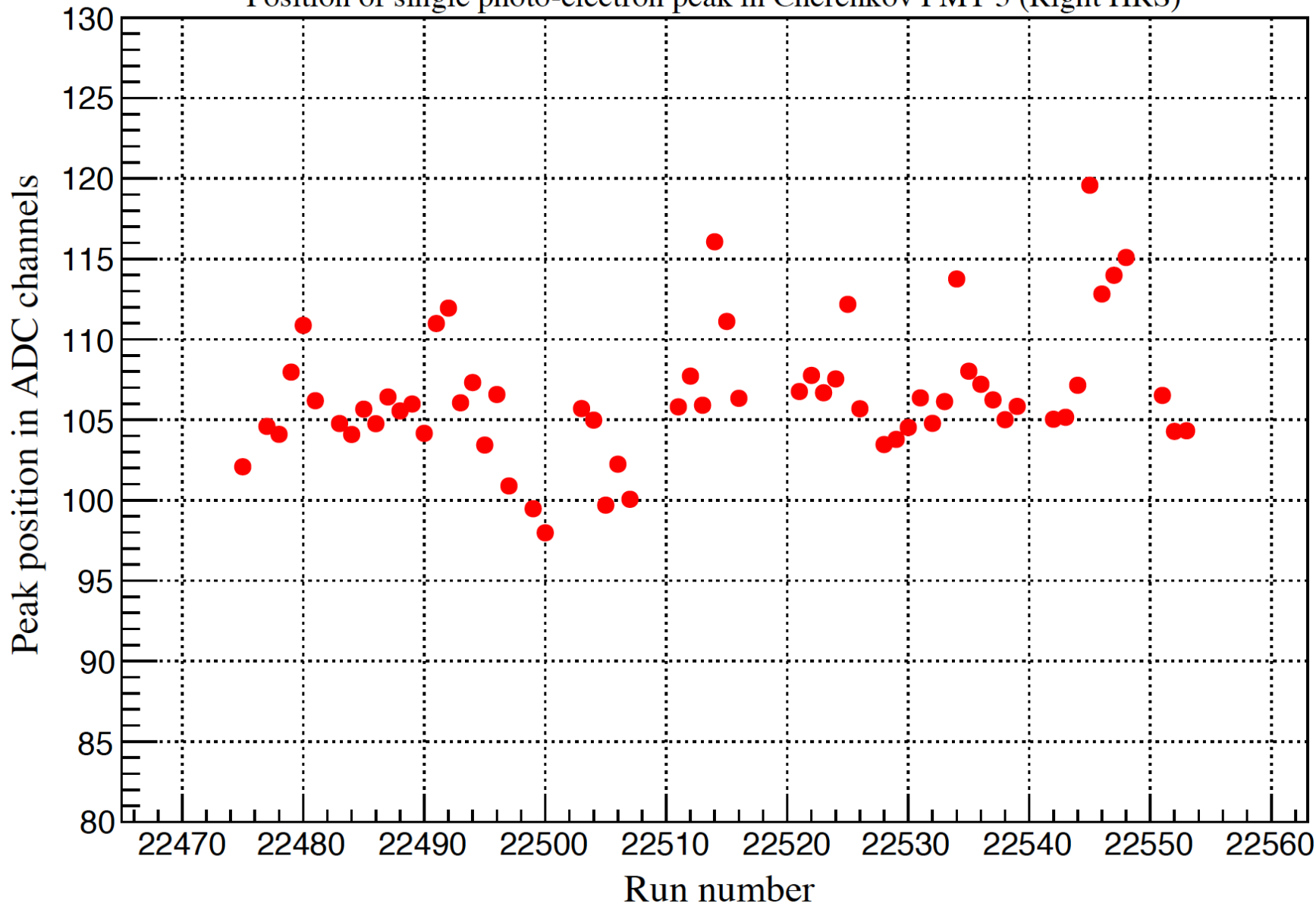
R.cer.a_p[0]



R.cer.a_c[0]



Position of single photo-electron peak in Cherenkov PMT 3 (Right HRS)



Study Plan

Before Experiment:

- Check cables and front end.
- Adjust HV/ gain, check PMT signal with cosmic rays.

Analysis:

- Align single-photon peak;
- PID (with calorimeter)