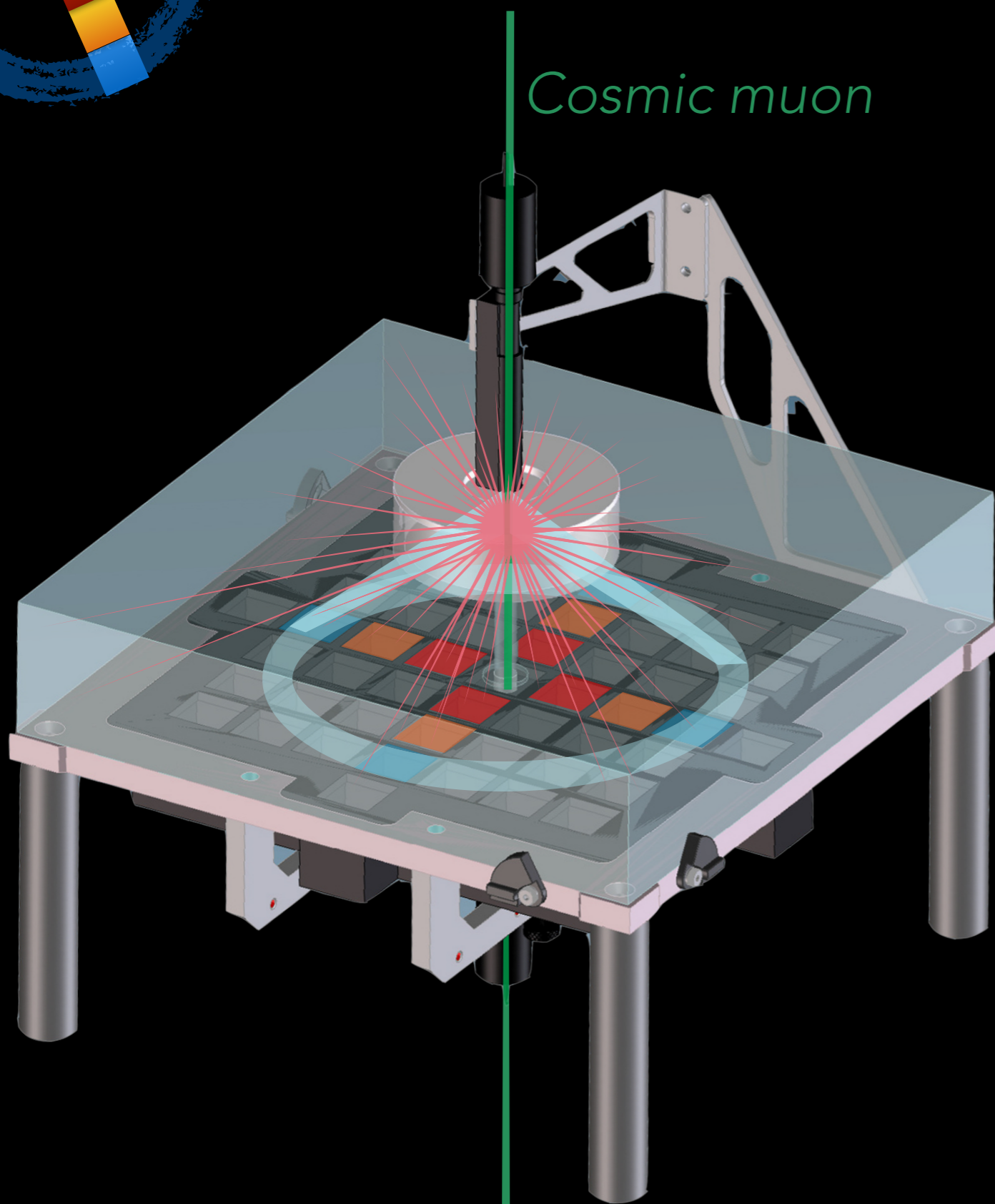
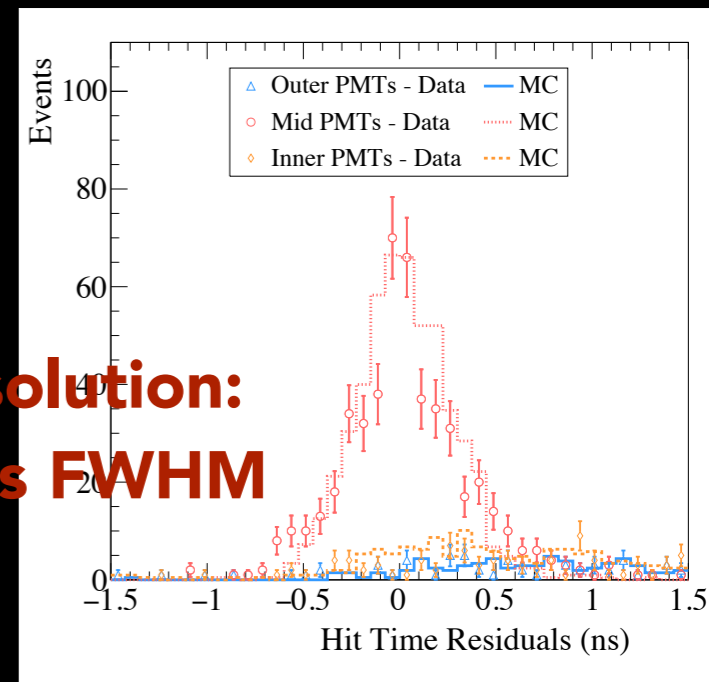


CHESS: THE CHERENKOV/SCINTILLATION SEPARATION EXPERIMENT



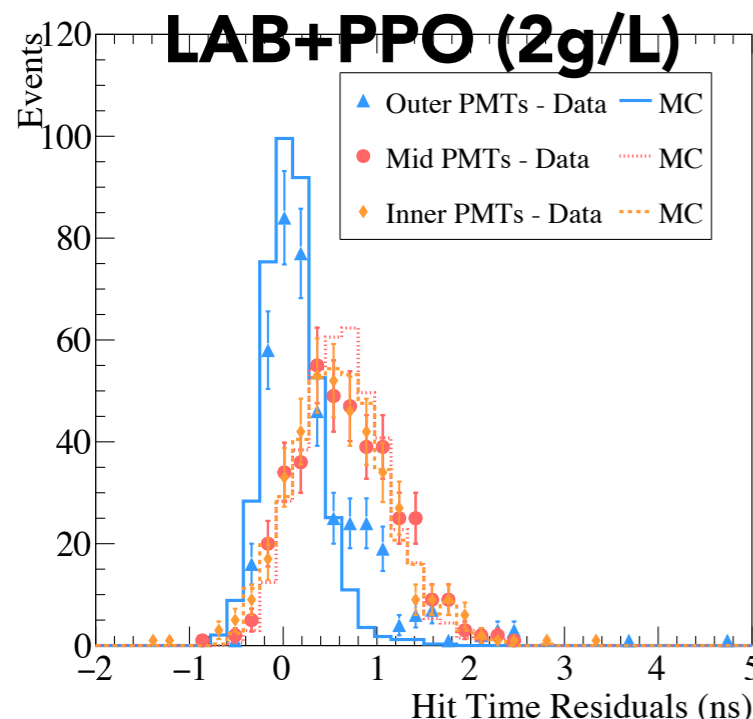
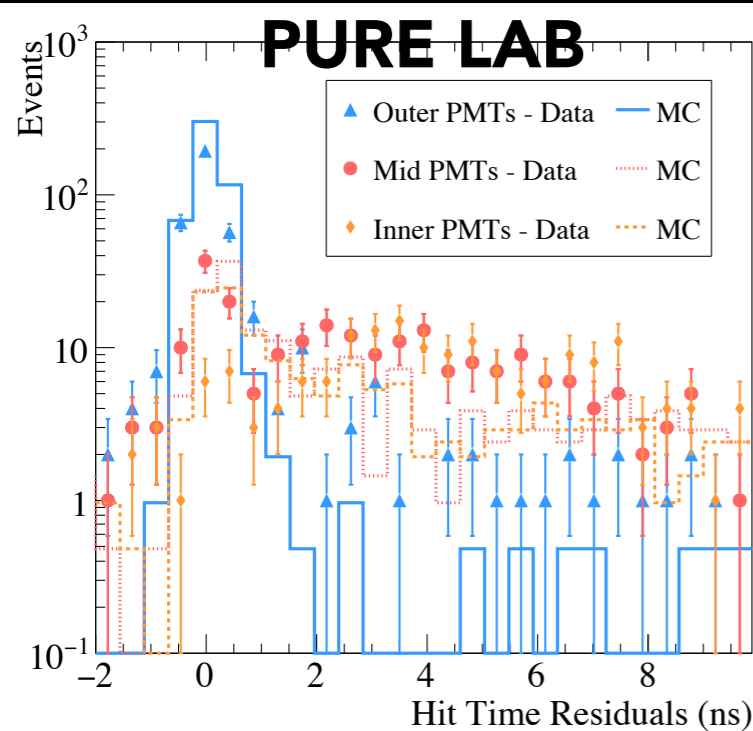
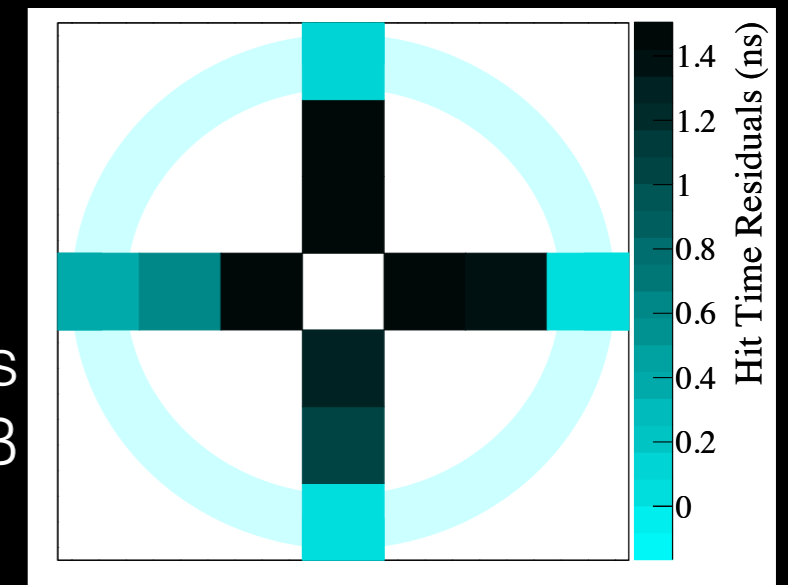
- Designed for Cherenkov ring imaging on LS → Provide proof of Cherenkov/Scintillation light separation
- Vertical cosmic muons go through a target filled with LS yielding a Cherenkov ring + scintillation light that are detected in a 12-PMTs array
- Cherenkov ring is detected in one of the radial PMT grouping while the rest is just hit by scintillation light
- Demonstrate time separation using low TTS PMTs (H14193) and fast sampling digitization (CAEN-V1742)

**Time resolution:
 338 ± 12 ps FWHM**



PURE LS RESULTS

Hit time residuals
averaged for pure LAB



- PMT hit times are corrected by electronic delays, time of flight and event time
- The Cherenkov ring is detected in the outer-most PMTs → Clearly register the earliest hits, proving the Cherenkov/Scintillation time separation
- A time cut is defined to select Cherenkov light maximizing the efficiency and minimizing the contamination → **tc = 0.4ns**:
 - Pure LAB:
 - **Č efficiency = 83 ± 3 (stat+syst)%**
 - **Scint. contamination = 11 ± 1 (stat+syst)%**
 - LAB+PPO:
 - **Č efficiency = 70 ± 3 (stat+syst)%**
 - **Scint. contamination = 36 ± 5 (stat+syst)%**

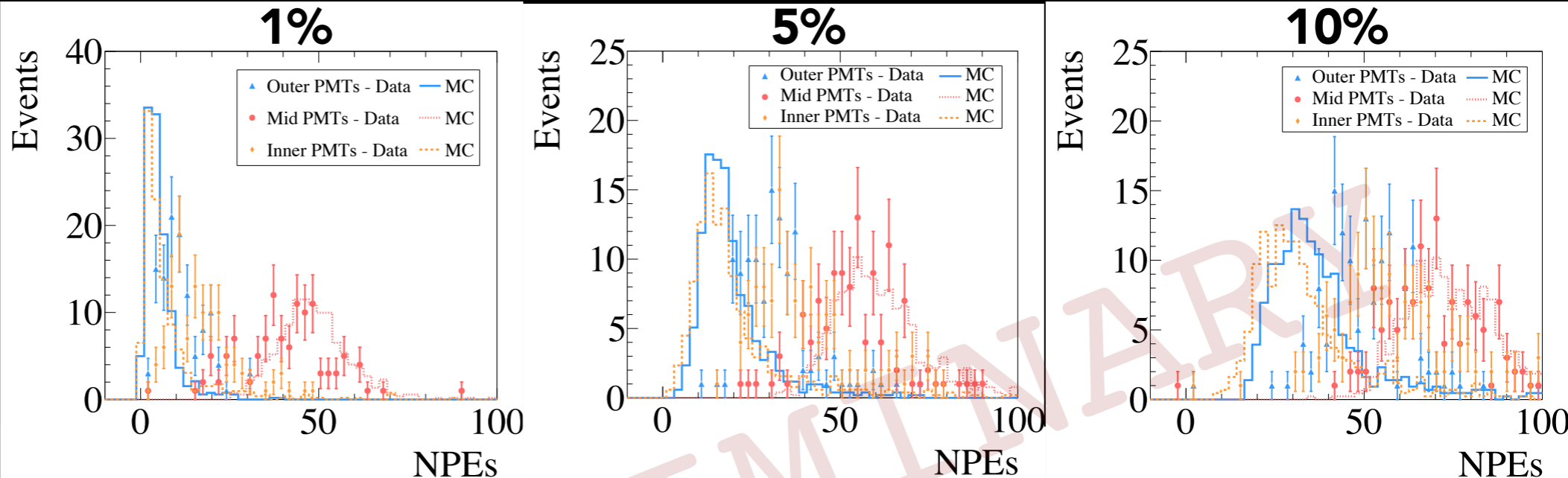
WbLS PRELIMINARY RESULTS

- Studied WbLS (LAB+PPO(2g/L)+water) at three different LS concentrations: 1%, 5% and 10%
- In water, the Cherenkov ring sits on the middle PMTs (red)

Cherenkov efficiency and scintillation contamination of a time cut

Sample	Time Cut (ns)	ϵ	S
WbLS 1%	0.64	0.96 ± 0.01	0.11 ± 0.01
WbLS 5%	0.4	0.87 ± 0.02	0.14 ± 0.01
WbLS 10%	0.4	0.83 ± 0.02	0.19 ± 0.01

NPEs



Time residuals (ns)

