



Status of ICARUS commissioning

B. Howard

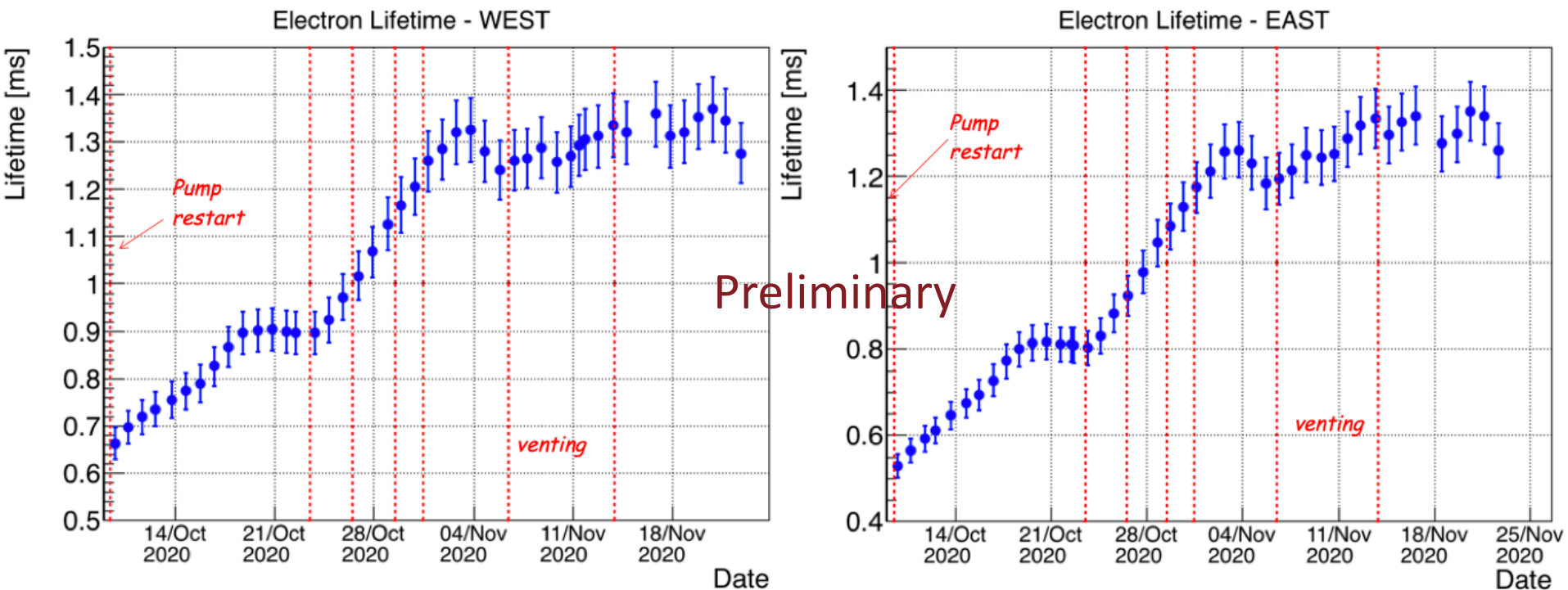
PMG/AEM 12/03/2020

November updates

- ICARUS cryogenic system.
 - Purity stabilized in early November
 - Work on regenerating gas recirculation filters ongoing – West filters have been regenerated
 - Purity incident in East module last week reduced lifetimes but are now recovering
- PMT/Triggers
 - Working to get White Rabbit set up to begin looking at beam gates
 - Working on communication between triggers and DAQ
 - Work on PMT LVDS (logic output of PMT digitizers for generating trigger primitives)
- TPC
 - Continued efforts to characterize noise and understand noise sources
 - Alberto Guglielmi & Gabriele Rampazzo on-site: short stay to conduct commissioning activities
- CRT
 - Progress implementing recently installed **5** new side CRT wall sections into DAQ (see later slide)
- Subsystem experts continue to come together & ramp up
 - Some WG held expert training sessions in November
 - TPC Power Supply experts have been on-call throughout month of November
- Remote shifts 24/7: Looking into Google phone communication between MCR/shiffters overseas
- Experimental Operations Plan (EOP) submitted for Operational Readiness Review next week

Cryogenic system / Liquid purity

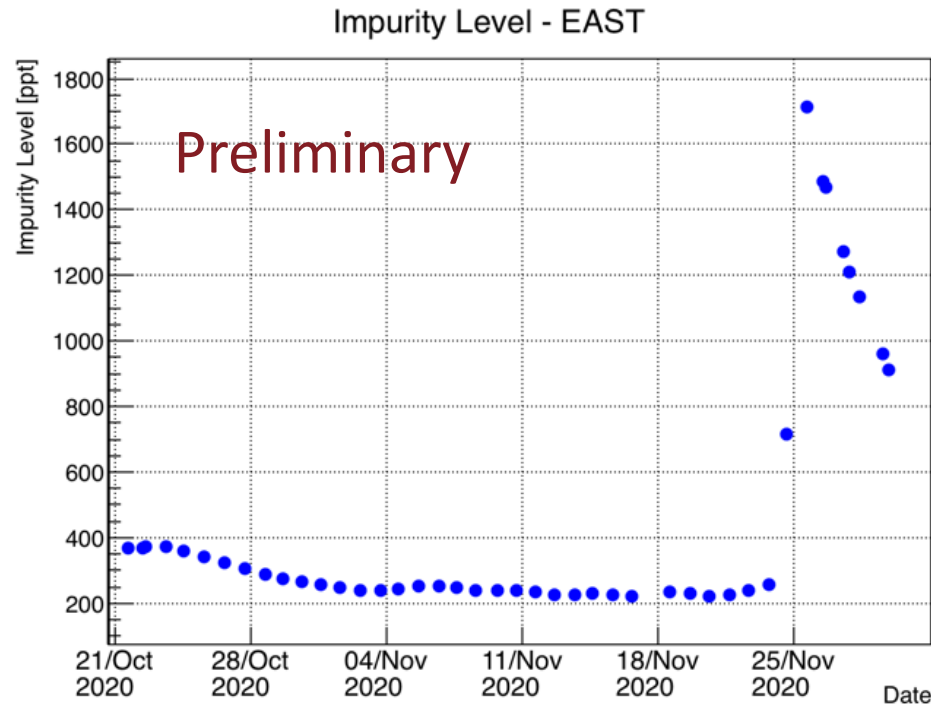
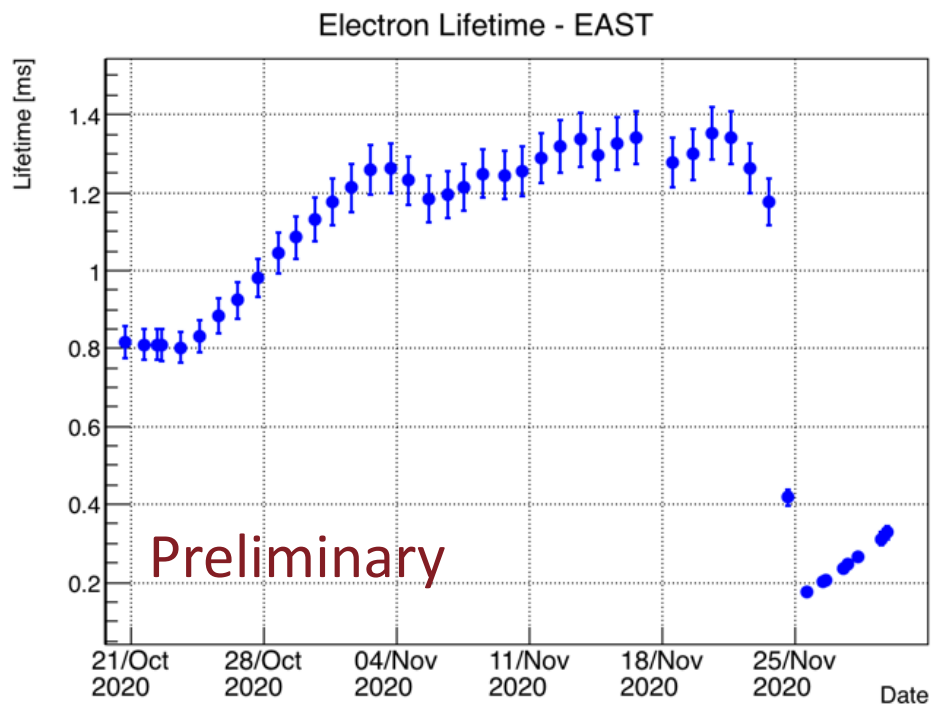
- Purity stabilized around 1.3 ms in early November.



- Plans for improvement of lifetime beyond 3ms begin with the ongoing regeneration of the filters. Further possible interventions are under consideration.

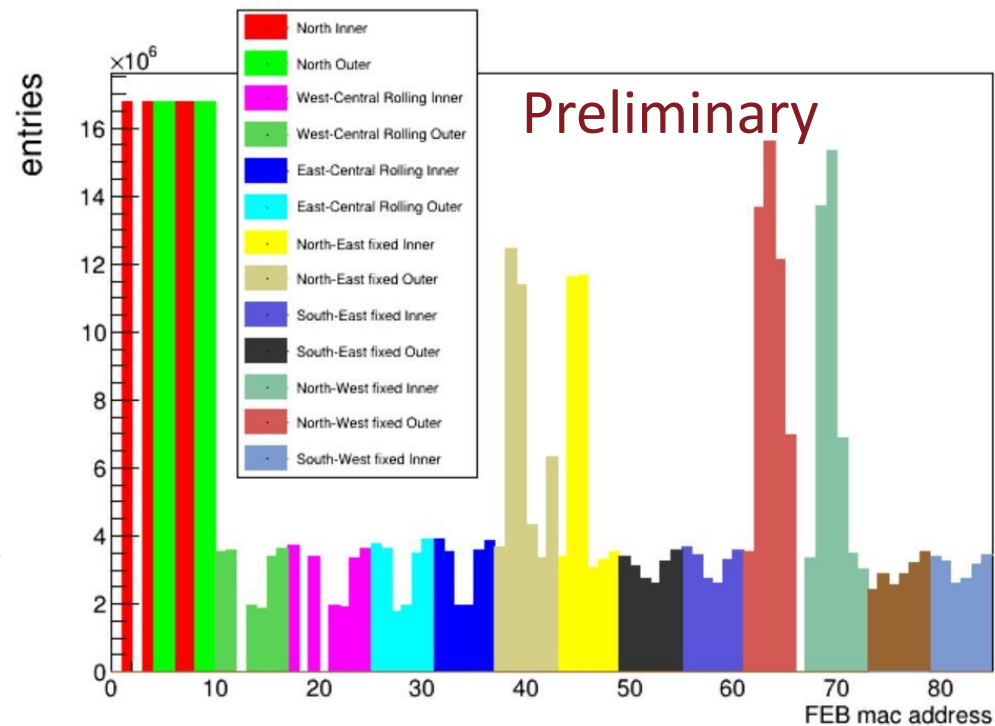
Cryogenic system / Liquid purity

- On/around November 24, there was an incident resulting in the introduction of impurities on the East cryostat
 - Pinpointed to an intervention on a re-condenser on Nov 23, possibly generating some back diffusion from (pump) plumbing connected on Nov 24
 - Purity climbing since then, expect to return in coming few weeks. Remained at 1.2-1.3 ms level in West cryostat



CRT

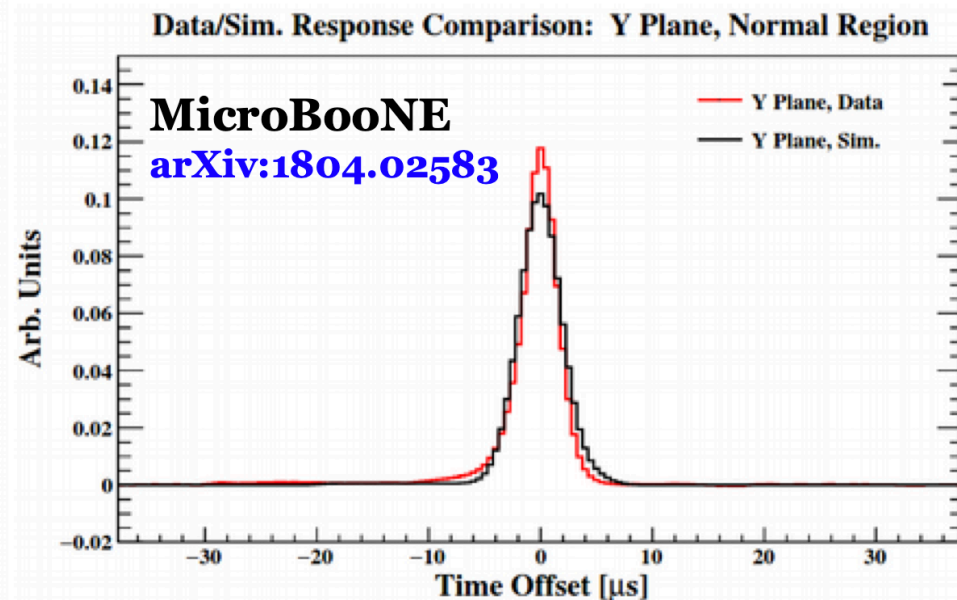
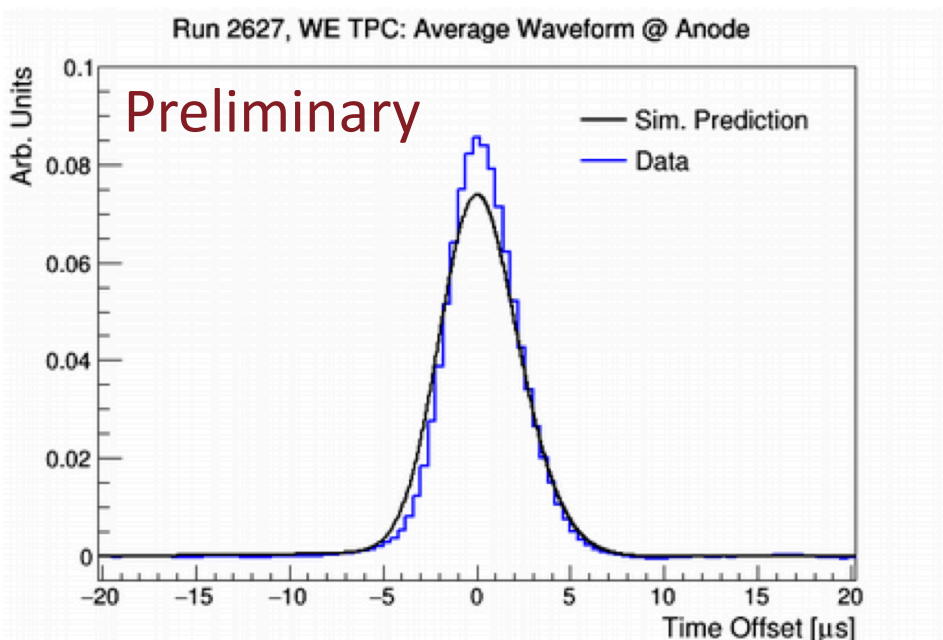
- Work to get the **5** new side CRT wall sections (installed even during the pandemic) into the readout
- Have been included some shifter-piloted runs in a noise study configuration.
- Working toward more standard inclusion. Now all of Side CRT except South Wall installed/connected
- High rates in some CRT components (generally nearer the cryo). Investigations into noise taking place.



CRT by Readout Board from test run

Calibration updates

- Average waveforms from anode-cathode crossing cosmic events useful to study detector response
 - Pick out wires at readout ticks from near the anode and near the cathode
- Useful for data-MC comparisons of response. Waveforms from cathode also useful to investigate diffusion constants
- Average anode waveform – overall general agreement but hints at minor response mismodeling – similar to MicroBooNE



Trigger updates

- Working to get White Rabbit network back online to begin looking at beam gates and to start commissioning beam trigger, timing & synchronization
- Working on communication & synchronization between triggers/DAQ
- Work on PMT LVDS signals/rates and getting this together
 - Have been studying rates – different logic, thresholds, etc.
 - Debugging logic in some LVDS channels
 - Then will set PMT thresholds and set trigger logic and can do timing studies relating to beam window: monitor rate of PMT trigger inside/outside window, expect excess inside beam window. (Studies centering of beam window)

Elapsed Time [x 10 sec]	0	4469	#1 CH 14
250		2180	#2 CH 12-13
		4228	#3 CH 10-11
Use this to Stop		2304	#4 CH 8-9
		4872	#5 CH 6-7
		7304	#6 CH 4-5
		4490	#7 CH 2-3
		20831	#8 Ch 0-1
		4574	#9 CH 14
		3723	#10 CH 12-13
		4463	#11 CH 10-11
		4302	#12 CH 8-9
		6351	#13 CH 6-7
		6611	#14 CH 4-5
		6008	#15 CH 2-3
		16567	#16 CH 0-1
		3402	#17 CH 14
		3626	#18 CH 12-13
		4441	#19 Ch 10-11
		3646	#20 CH 8-9
		4970	#21 CH 6-7
		5668	#22 CH 4-5
		5197	#23 Ch 2-3
		17969	#24 CH 0-1