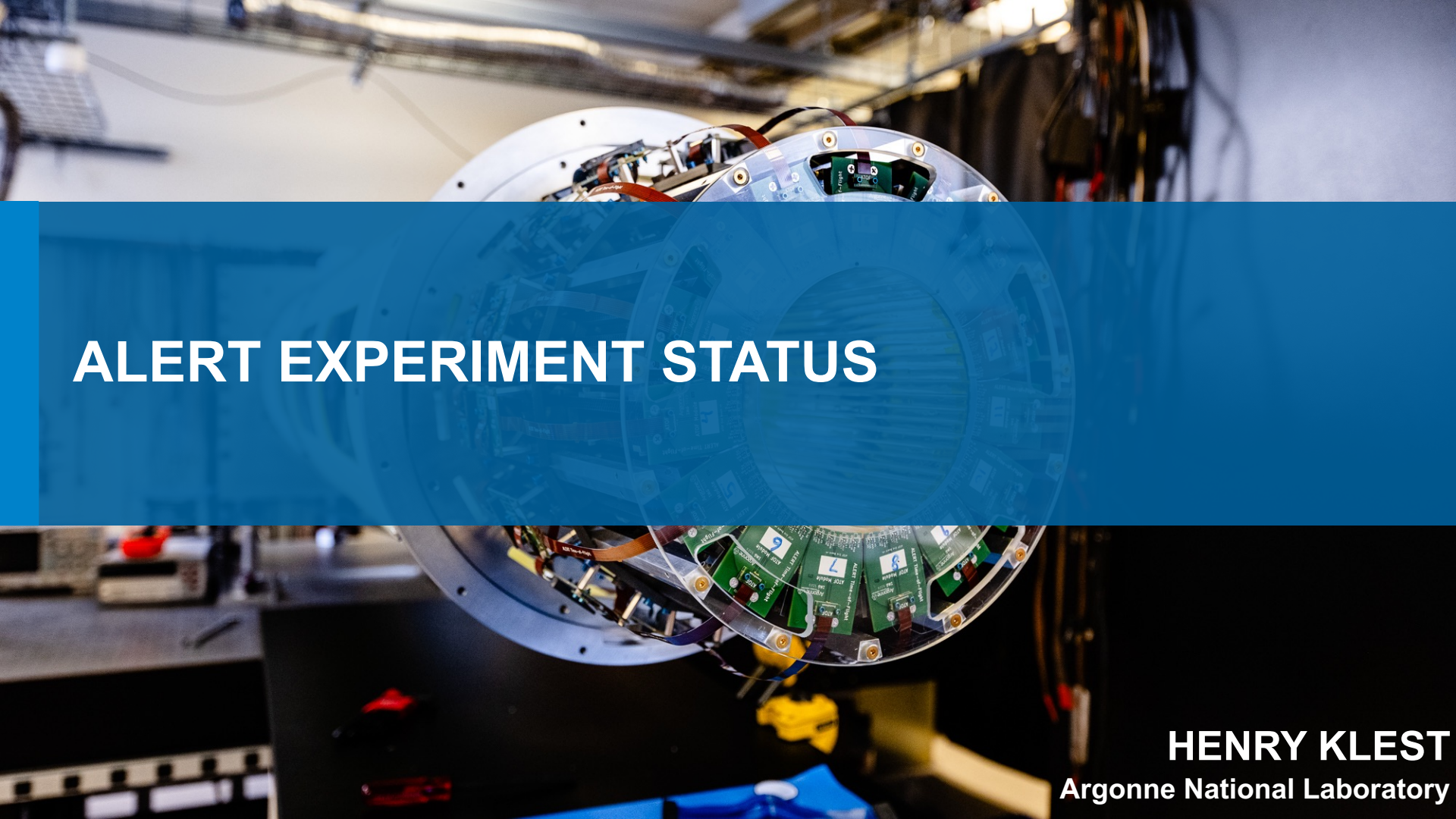


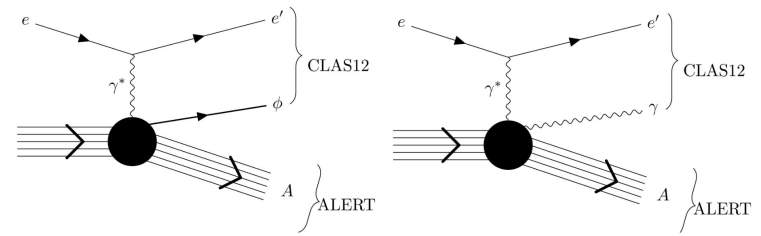
A circular electronic device, possibly a detector or sensor array, is shown in a laboratory setting. The device has a white outer ring and a transparent inner section revealing several green circuit boards. Each board is labeled with a number (1, 2, 3, 4, 5, 6, 7, 8, 9, 10) and the text "ALERT THRESHOLD". The device is mounted on a metal frame. In the background, there are various laboratory equipment, including a rack of electronic modules and a yellow tool. A blue object is visible in the foreground.

ALERT EXPERIMENT STATUS

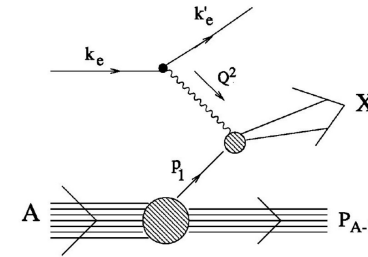
HENRY KLEST
Argonne National Laboratory

WHY ALERT?

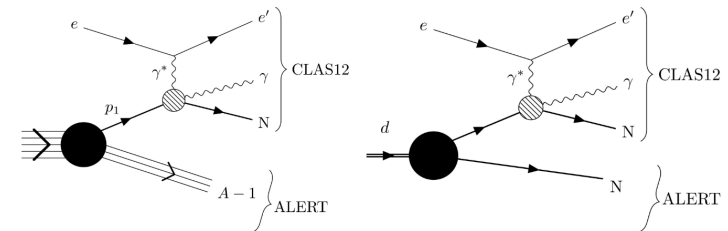
- A Low Energy Recoil Tracker (ALERT)
 - Designed to precisely identify and track ^4He , ^3He , t , d , p
- ^4He has a uniquely simple set of GPDs as a bosonic nucleus
 - Can be accessed directly by a single observable!
- Ability to tag spectators enables studies of nucleon modifications *in-nucleo*
 - Do we see the EMC effect when we tag the spectator?
 - Do the Compton form factors of bound nucleons differ from free ones?



Coherent processes for ^4He GPDs



Tagged DIS for EMC Effect

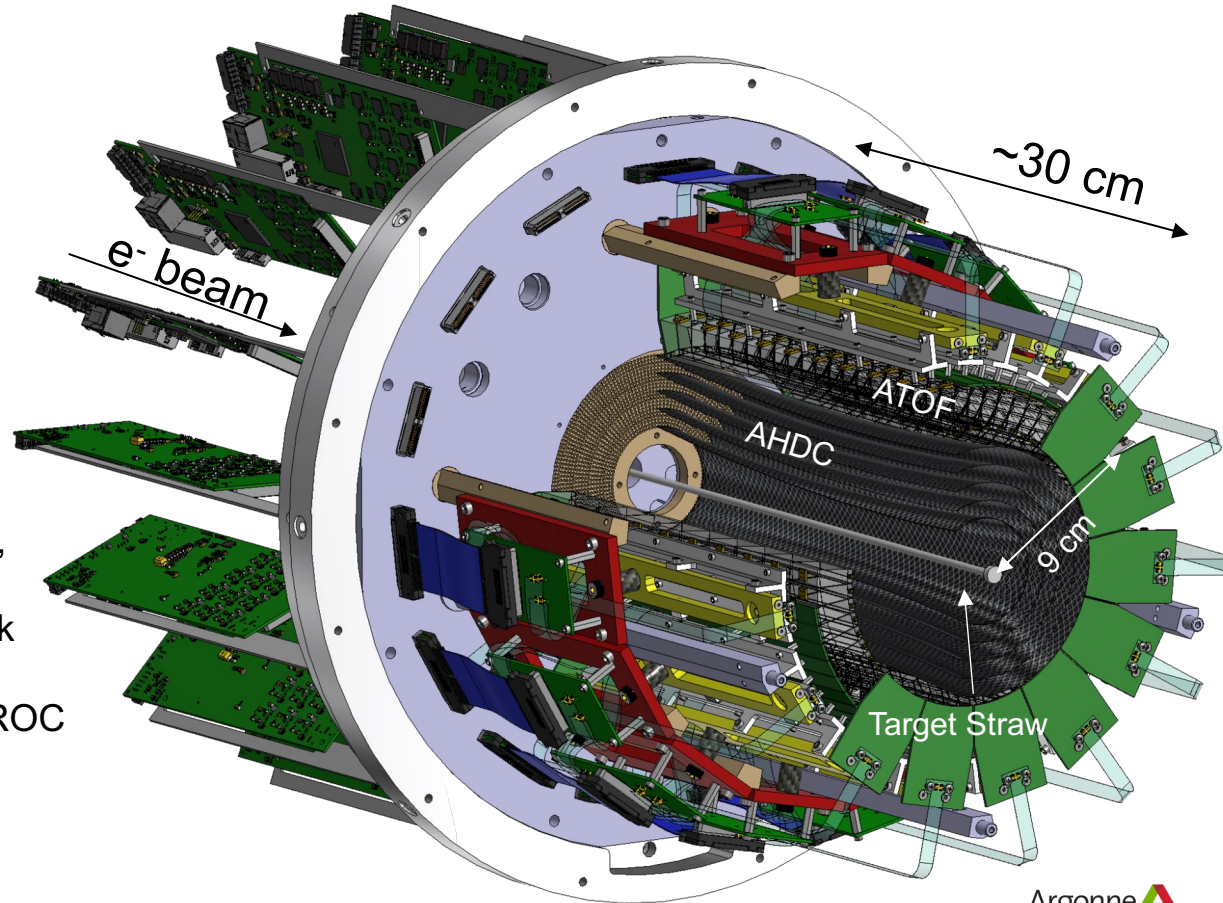


Incoherent DVCS for imaging bound nucleons

- A Low Energy Recoil Tracker (ALERT) – Designed to precisely identify and track ^4He , ^3He , t, d, p

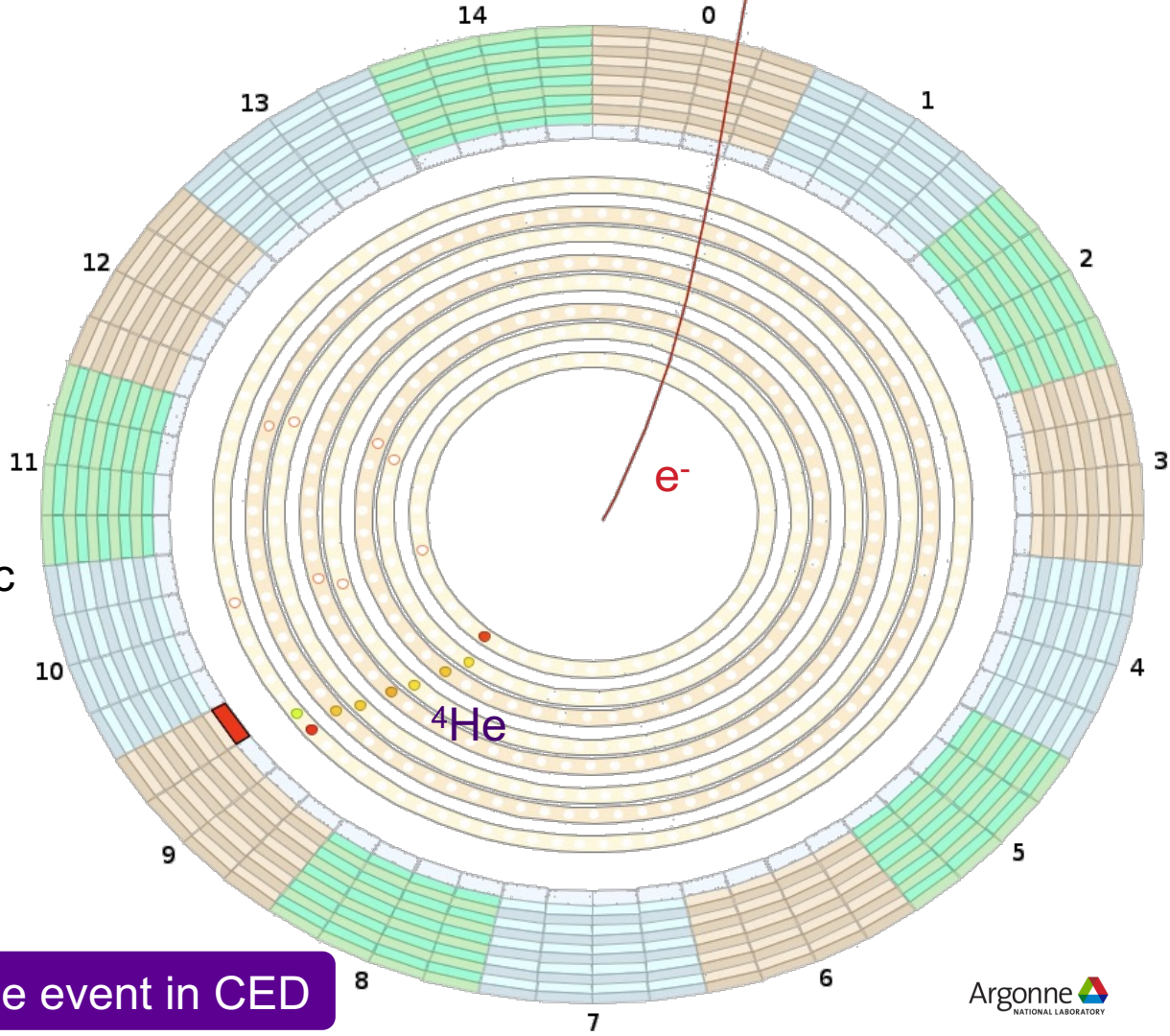
- Consists of a drift chamber (AHDC)
 - ~7 cm outer radius
 - 576 drift cells (4mm x 4mm)
 - 20° stereo angle
- And a time-of-flight (ATOF)
 - 60 bars with two-sided readout, 3mm thick & 28 cm long
 - 600 (60 in ϕ x 10 in z) 2 cm thick wedges
 - SiPM photosensors with PETIROC ASICs providing ToA & ToT

ALERT DETECTOR



RUN THUS FAR

- 4/6 – Begin commissioning with 2.2 GeV beam
- Ran hydrogen, deuterium, ^4He targets
- Gained very valuable elastic data for testing reconstruction of recoil in ALERT, scattered electron tells us where the recoil went



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Elastic ^4He event in CED

Argonne
NATIONAL LABORATORY

RUN THUS FAR

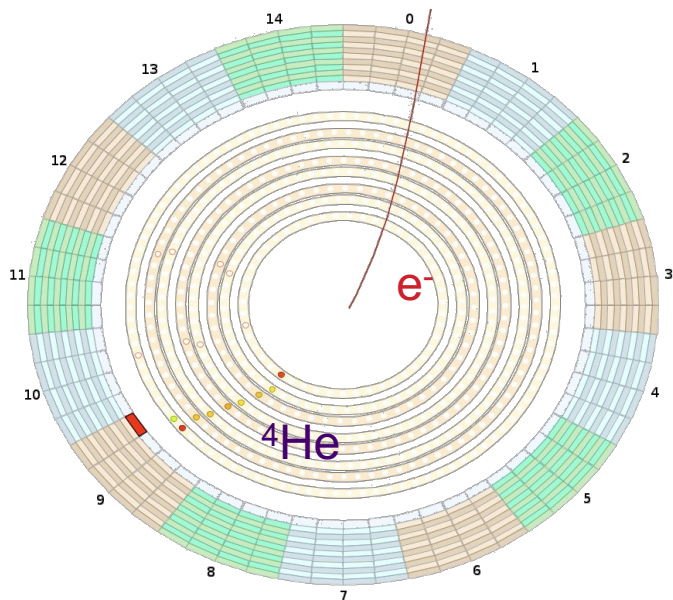
- 4/11 – Turn the dial to 11! (GeV)
 - Scanned beam currents & trigger configurations to find an operating point
- Lumi scan took currents up to 500 nA, **highest ever delivered to Hall B!**
 - No issues from accelerator side, 500 nA delivered no problem!
 - Nominally ALERT was to run 500 nA and 1 mA on a target of 44 psig
 - 500 nA occupancies were determined to be too high for reliable reconstruction
- FD & FT occupancies driven mainly by the target window, not the data we want!
 - Increasing target pressure is a preferable avenue to more physics data
- Compromise found at **325 nA and 66 psig**



RUN THUS FAR

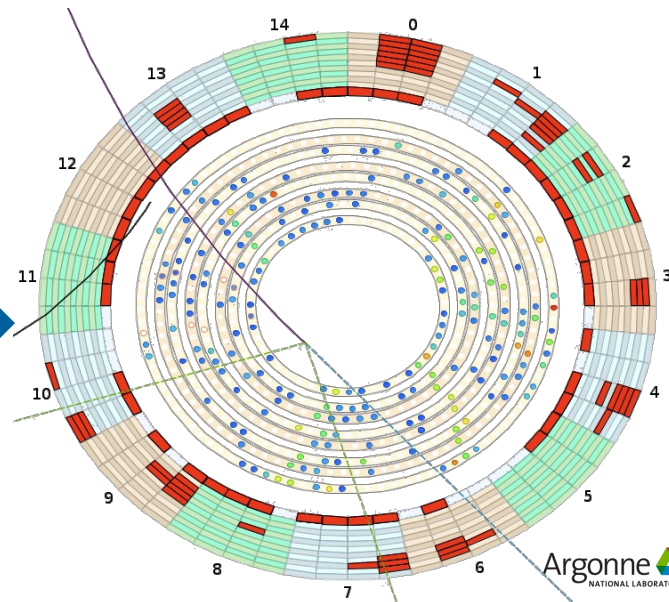
- 4/11 – Turn the dial to 11! (GeV)
 - Scanned beam currents to find a reasonable working point
 - Ran at 250 nA (safe setting) while subsystem experts analyzed the lumi scan data
 - Nominally ALERT was to run 500 nA and 1 mA on a target of 44 psig
 - Compromise found at 325 nA and 66 psig

Elastic ^4He at 2.2 GeV 🧐



+ 8.5 GeV &
300 nA

10.7 GeV @ 325 nA! 🤖

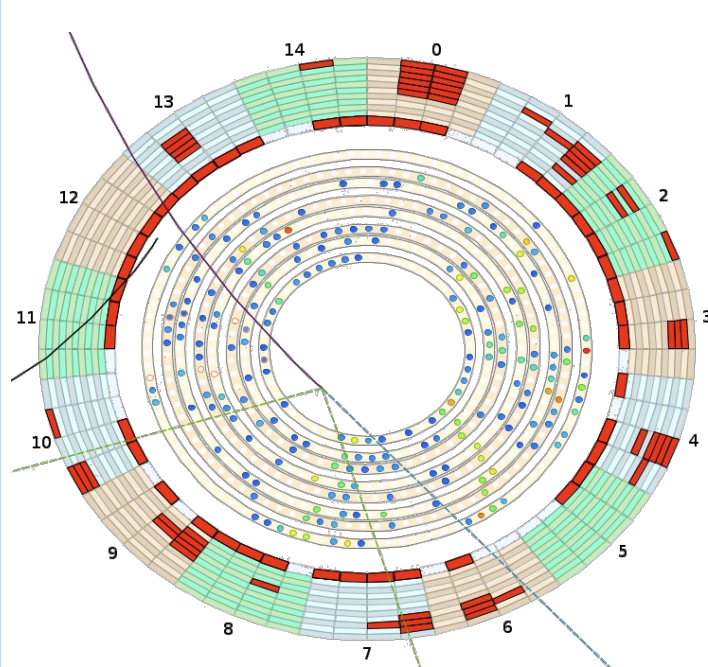


RUN THUS FAR

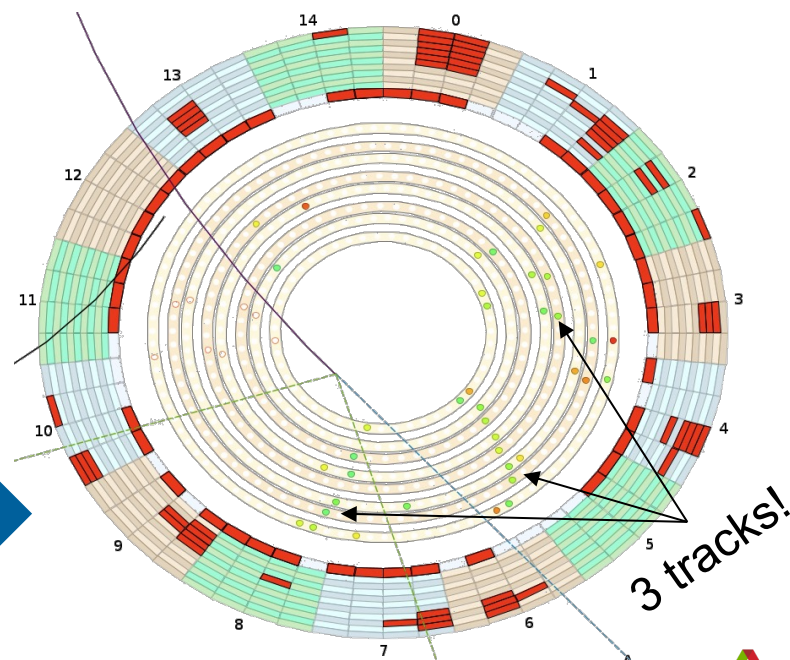
***CED makes it look a lot worse than it is**

Most ATOF hits are outside the timing peak & AHDC hits are tiny ADC

Both are easy to reject!



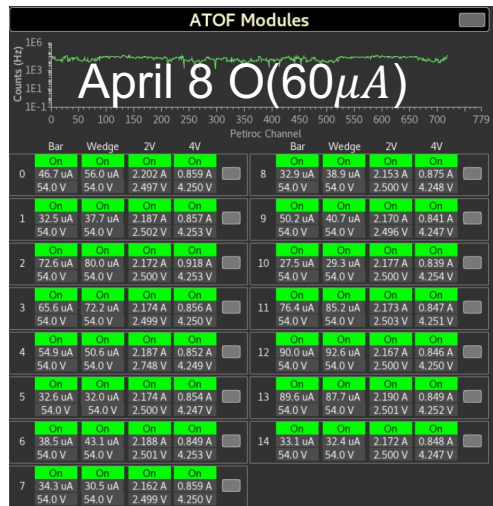
ADC Cut
on AHDC



TRIALS AND TRIBULATIONS

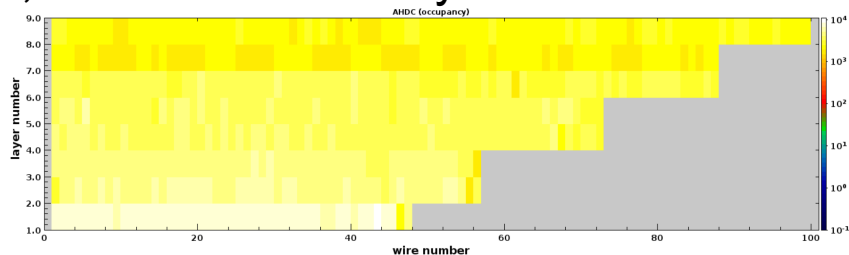
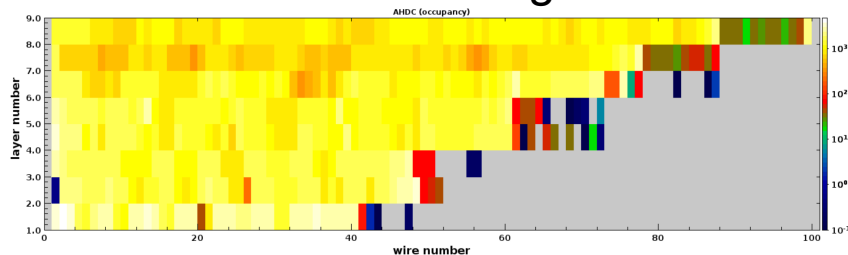
- 4/6 – Run starts
 - Immediately a few issues with the target
 - Control system is very finicky and would occasionally break
 - By now Felix has tamed the dragon and regularly operates it stably ☺
 - Pressure fluctuating several psi on timescale of hours – Solenoid valve wasn't operating properly in the field of the CLAS12 solenoid...
- ATOF currents grow rapidly as expected from rad damage of SiPMs

- Meant we had to swap a power supply for a higher current model (thankfully Yuri had one on hand!)
- Also meant thresholds & HV have needed tweaking throughout the run



TRIALS AND TRIBULATIONS

- 4/18 - Broken AHDC wire caused by solenoid trip
 - Fix involved removing the broken wire, recovered basically 100%!



- 4/30 – ATOF HV died in 1/30th of the azimuthal angle
 - Not a supply issue, Fixed by replacing the module with a fresh one
- 5/6 to 5/24 – Almost no usable beam due to persistent beam quality issues
 - Ran well for a while with Halls B, C, & D
 - When Halls A&C were both down, hard to guide the beam due to low beam current (can't see it well on the BPMs)
 - Adding Hall A into the mix further exacerbated the beam steering & bleedthrough issues

TRIALS AND TRIBULATIONS

- A few intermittent issues with ALERT electronics
 - AHDC DREAM connectors were occasionally breaking, presumably due to overcurrents caused by sparks in the chamber itself
 - ATOF HV supplied via the PETIROC board, single event upsets in those boards (which sit very close to the beamline) can cause HV trips
 - Requires running a script to reboot ATOF LV, HV, and clondaq11
- Beginning of June saw some trouble with the torus & solenoid
 - Fast ramp down and unable to ramp to full field, initially concerning
 - In the end, issue was tracked down to LCW flow sensors
- **Since then, quite smooth running overall!**

COLLECTED CHARGE SUMMARY

- ALERT approved for ~2.6 coulombs of charge on a 3 atm target
 - Corresponds to 155 fb^{-1}
 - Been running 325 nA on a 4.6 atm target

Configurations	Proposals	Targets	Beam time request days	Beam current nA	Luminosity* $\text{n/cm}^2/\text{s}$
Commissioning	All [†]	^1H , ^4He	5	Various	Various
A	Nuclear GPDs	^4He	10	1000	6×10^{34}
B	Tagged EMC & DVCS	^2H	20	500	3×10^{34}
C	All [†]	^4He	20	500	3×10^{34}
TOTAL			55		

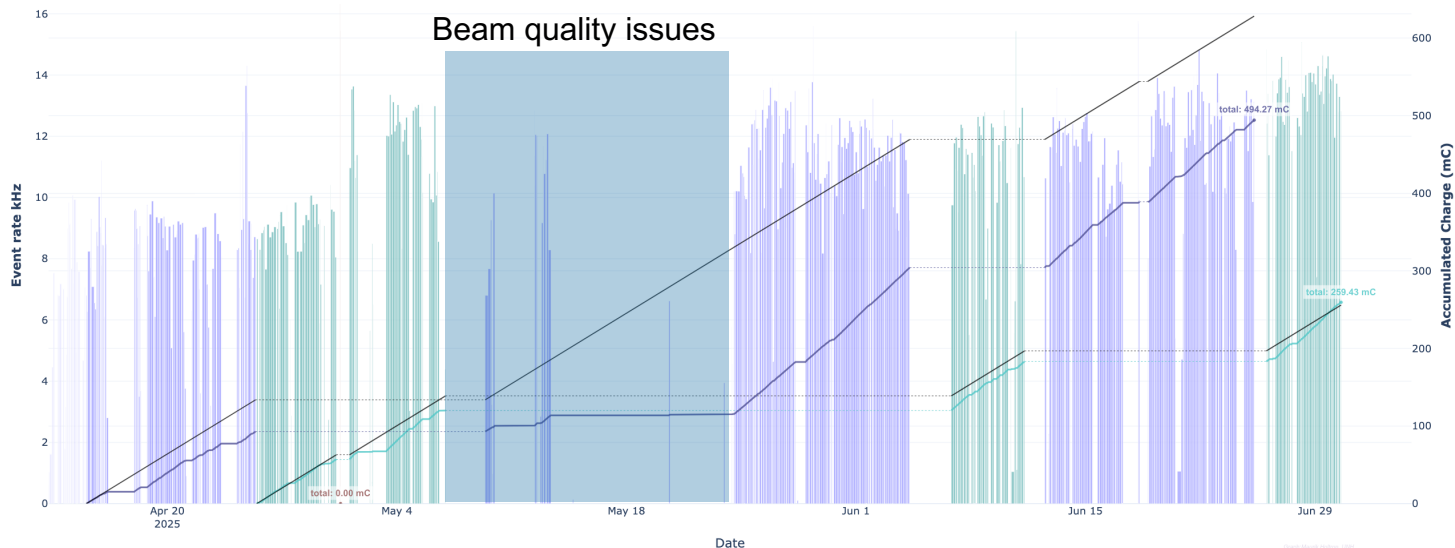
- Collected so far:
 - 46 fb^{-1} of ^4He
 - 24 fb^{-1} of ^2H

- Projected to get ~100 fb^{-1} of the approved 155 fb^{-1}



RGL/ALERT 2025 Progress IPM2C24

$E_0 = 10.677 \text{ GeV}$



CALIBRATIONS

- Lots of good RG-L calibration work ongoing for FD & FT
 - DC alignments & beam offsets completed
 - Very helpful for calibration of ALERT!
 - Global timing, RF, DC time offset, FTOF, ECal, FT-cal, & Cherenkov calibrations ongoing
- **Making record progress** for CLAS12 calibration thanks to experience from recent run groups and efforts of many people!
- For status of ALERT calibrations, see Michael's talk from Tuesday!

FUTURE PLANS

- ALERT → SRC-ALERT on 8/7 (See Florian's talk)
 - Plan to run 6.4 GeV on ^4He
 - Tag the final-state spectator in quasi-elastic $^4\text{He}(e,e'pd_s)n$, $^4\text{He}(e,e't_s)p$
 - Enables a fully exclusive study of proton-neutron SRC pairing!
 - Also provides a useful dataset at lower energies for calibrating the end of the non-SRC ALERT

- Much work to be done on reconstruction of real data in ALERT!
 - Valiant efforts of CLAS12 calibration team are expediting this process!

7/31/25	Thursday	2.12	Run Group L
8/1/25	Friday	2.12	Run Group L
8/2/25	Saturday	2.12	Run Group L
8/3/25	Sunday	2.12	Run Group L
8/4/25	Monday	2.12	Pass change
8/5/25	Tuesday	2.12	Run Group L
8/6/25	Wednesday	2.12	Run Group L
8/7/25	Thursday	2.12	Pass change
8/8/25	Friday	2.12	E12-23-013
8/9/25	Saturday	2.12	E12-23-013
8/10/25	Sunday	2.12	E12-23-013
8/11/25	Monday	2.12	E12-23-013
8/12/25	Tuesday	2.12	E12-23-013
8/13/25	Wednesday	2.12	E12-23-013
8/14/25	Thursday	2.12	E12-23-013
8/15/25	Friday	2.12	E12-23-013
8/16/25	Saturday	2.12	E12-23-013
8/17/25	Sunday	2.12	E12-23-013
8/18/25	Monday	2.12	E12-23-013
8/19/25	Tuesday	2.12	E12-23-013
8/20/25	Wednesday	2.12	E12-23-013
8/21/25	Thursday	2.12	E12-23-013
8/22/25	Friday	2.12	E12-23-013
8/23/25	Saturday	2.12	E12-23-013
8/24/25	Sunday	2.12	E12-23-013
8/25/25	Monday	2.12	E12-23-013
8/26/25	Tuesday	2.12	E12-23-013
8/27/25	Wednesday	2.12	E12-23-013
8/28/25	Thursday	2.12	E12-23-013
8/29/25	Friday	2.12	E12-23-013
8/30/25	Saturday	2.12	E12-23-013
8/31/25	Sunday	2.12	E12-23-013
9/1/25	Monday	2.12	E12-23-013
9/2/25	Tuesday	2.12	E12-23-013
9/3/25	Wednesday		

CONCLUSION

- After some hiccups, RG-L run now progressing nicely
 - On track for 100 fb⁻¹ of 155 fb⁻¹ from proposals
 - Aiming for a final data set which consists of 2/3 ⁴He target and 1/3 ²H
 - Commissioning phase completed as planned
 - No major issues!
- Next steps are CLAS12 & ALERT calibrations, combined reconstruction, data analysis

Thanks!

