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Light Gain Measurement

Use the CERN data taking

- Only ^{241}Am sources in detector

Ideal World case:

- Find a range of E/p settings and gas mix that let us make a light gain measurement in beam off runs
- Run Ed's charge gain analysis on these runs and correlate the two

Actual World:

- So far only found enough good data in beam on runs

Strategy - Details

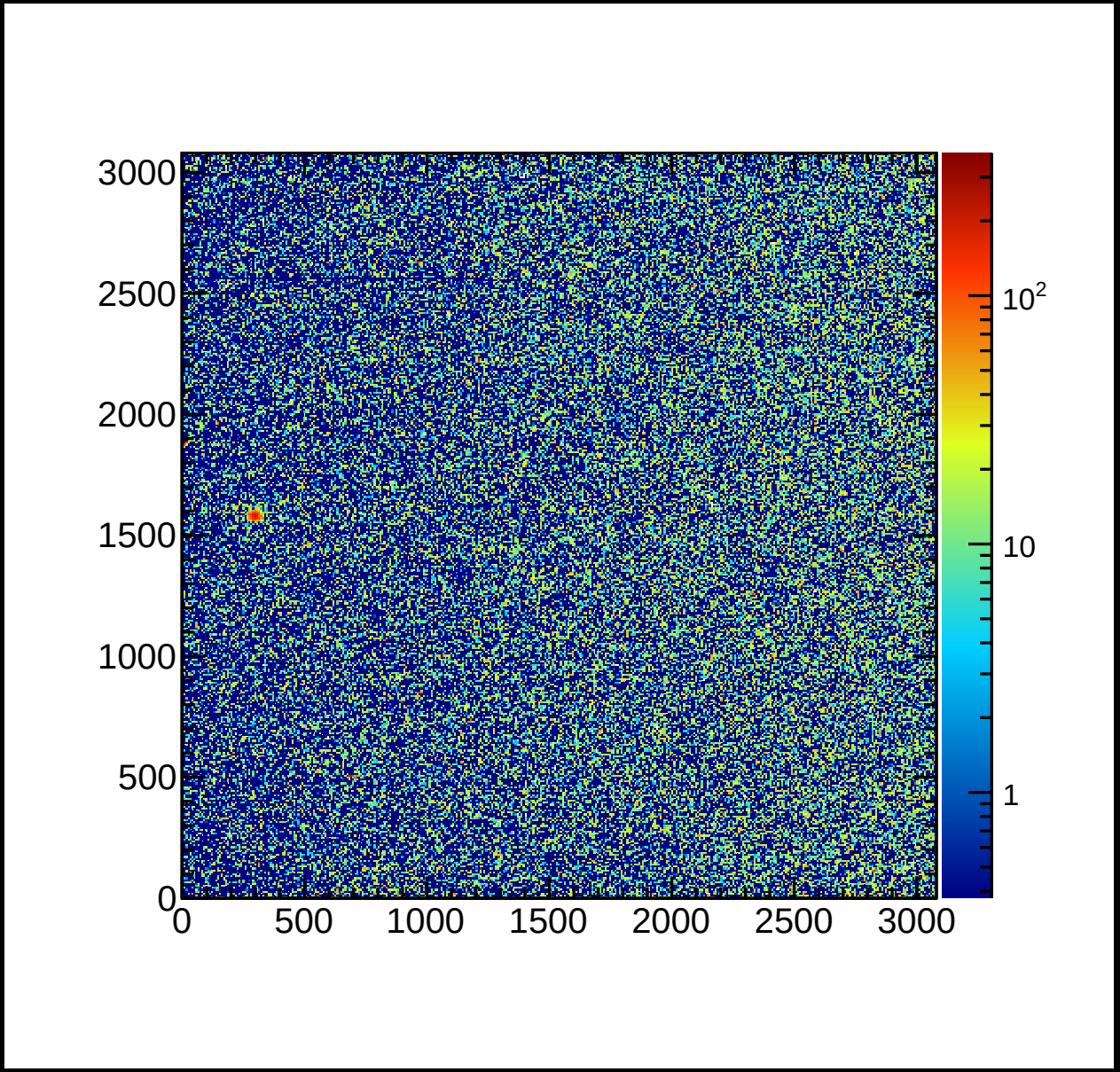
Use the hanging ^{241}Am source between cameras 0 and 1

- Most visible in camera 1 - use this camera
- Find good settings and runs
- Apply Zack's calibration
- Sum all the pixels in clustered region around the source
- Plot sums against anode 3 voltage

Gas Mixtures

Had the idea to look at the pure argon runs but didn't find different enough voltage settings at 4 bar to see change in gain

R1257014 (4 bar Ar) - Hanging Source Camera 1



Run Selection

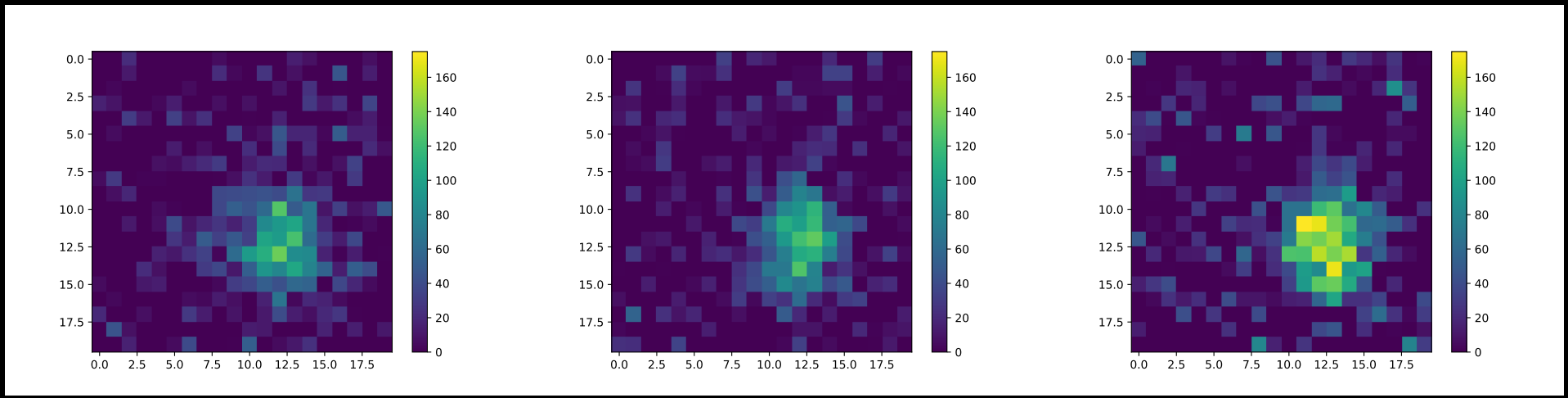
Separately I noticed that most of the tracks Dom found came from a few hour period on September 13th (3 bar argon running)

Some good variation in anode 3 settings

- Run 1256079 1500/2100/2700 (5250)V
- Run 1256080 1500/2100/3000 (5250)V
- Run 1256081 1500/2100/4500 (5250)V

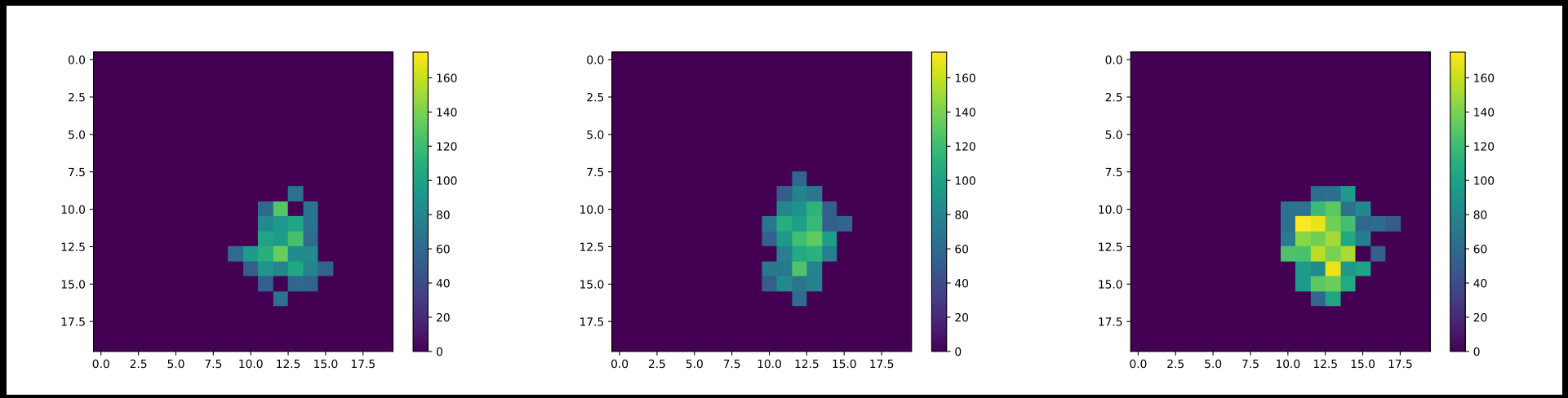
Sources

Anode 3: 2700 V, 3000 V, 4500 V

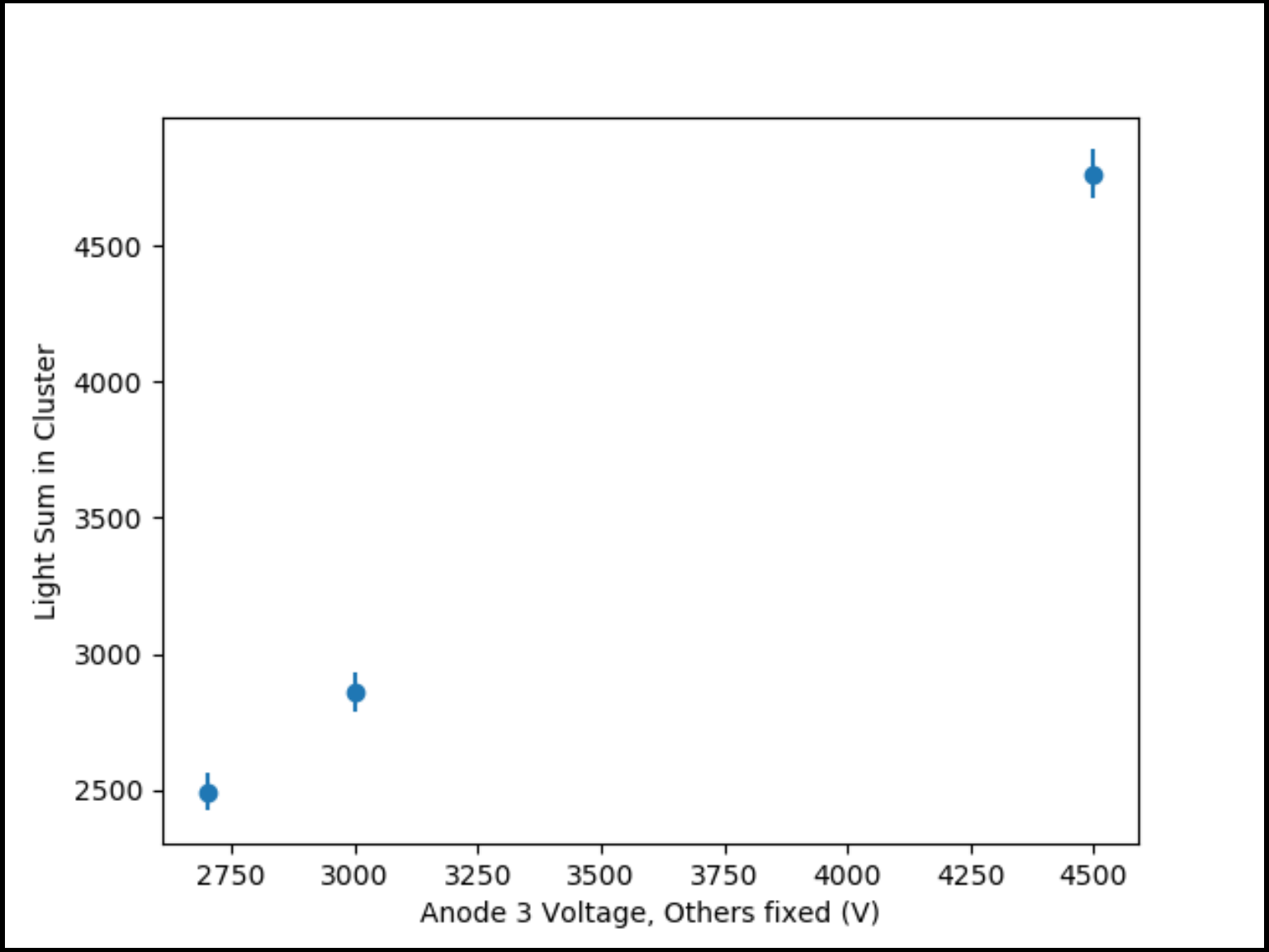


After Clustering (no gaussian blurring)

Anode 3: 2700 V, 3000 V, 4500 V



Results


Light Sum in Cluster
4500
4000
3500
3000
2500
2750
3000
3250
3500
3750
4000
4250
4500
Anode 3 Voltage, Others fixed (V)

Notes and Caveats

Notes:

- Argon quite new and purer than we are used to(?) about 1 day old

Caveats:

- I didn't have access to proper calibration yet so I hacked it
- Errors for this calibration roughly calculated

Summary

- We see light gain in the CERN 3 bar argon data
- We'll need the proper calibration from Zack to re-do properly
- Should look at the charge gain during these runs even though beam on

- Relevant people please look at runs 1256079-1256081

									been form an Ar-CO2 premixed bottle and the second fill pure Ar. However, this does not fit with the numbers given in the logbook.
2018-09-01 09:21:00	2018-09-03 13:43:00	Ar (N5)	1.97E+00 barG	n.a.	n.a.	n.a.	n.a.	Ar (100)	440
2018-09-03 13:45:00	2018-09-03 19:05:00	Ar (N5)	1.96E+00 barG	CO2 (N48)	1.99E+00 barG	n.a.	n.a.	Ar-CO2 (99-1)	450
2018-09-03 19:19:00	2018-09-04 21:40:00	Ar-CO2 (99-1)	2.00E+00 barG	Ar (N5)	2.97E+00 barG	n.a.	n.a.	Ar-CO2 (99.25-0.75)	451
2018-09-04 21:50:00	2018-09-05 19:34:00	Ar-CO2 (99.25-0.75)	2.96E+00 barG	Ar (N5)	3.76E+00 barG	n.a.	n.a.	Ar-CO2 (99.4-0.6)	459
2018-09-05 19:35:00	2018-09-06 12:30:00	Ar-CO2 (99.4-0.6)	3.76E+00 barG	CO2 (N48)	3.81E+00 barG	n.a.	n.a.	Ar-CO2 (98.4-1.6)	470 From the log book it is not really clear if CO2 or Ar-CO2 was added. But I assume we added pure CO2 since this was avilable at the time.
2018-09-06 12:32:00	2018-09-06 19:17:00	Ar-CO2 (98.4-1.6)	3.79E+00 barG	N2 (N45)	3.87E+00 barG	n.a.	n.a.	Ar-CO2-N2 (96.8-1.6-1.6)	http://hpslow.pp.rhul.ac.uk/elog/HPTPC_Log/479
2018-09-06 23:05:00	2018-09-07 04:05:00	Ar (N5)	1.96E+00 barG	n.a.	n.a.	n.a.	n.a.	Ar (100)	483 **Analysis sheet: here**
2018-09-07 04:15:00	2018-09-07 08:59:00	Ar (N5)	1.95E+00 barG	N2 (N45)	2.05E+00 barG	n.a.	n.a.	Ar-N2 (96.7-3.3)	484
2018-09-07 09:00:00	2018-09-07 13:32:00	Ar-N2 (96.7-3.3)	2.04E+00 barG	N2 (N45)	2.06E+00 barG	n.a.	n.a.	Ar-N2 (96.1-3.9)	485 and 486
2018-09-07 14:25:00	2018-09-08 16:40:00	Ar-N2 (96.1-3.9)	2.07E+00 barG	CO2 (N48)	2.08E+00 barG	Ar (N45)	3.70E+00 barG	Ar-CO2-N2 (97.24-0.21-2.55)	487 After 20:10 the manometer was done for 2 h.
2018-09-08 16:40:00	2018-09-12 08:41:00	Ar-CO2-N2 (97.24-0.21-2.55)	3.62E+00 barG	CO2 (N48)	3.64E+00 barG	Ar (N45)	3.72E+00 barG	Ar-CO2-N2 (96.88-0.63-2.49)	494 for some periodes the manometer was not reading back sensible

2018-09-06 23:05:00	2018-09-07 04:05:00	Ar (N5)	1.96E+00 barG	n.a.	n.a.	n.a.	n.a.	Ar (100)	3bar **here**
2018-09-07 04:15:00	2018-09-07 08:59:00	Ar (N5)	1.95E+00 barG	N2 (N45)	2.05E+00 barG	n.a.	n.a.	Ar-N2 (96.7-3.3)	484
2018-09-07 09:00:00	2018-09-07 13:32:00	Ar-N2 (96.7-3.3)	2.04E+00 barG	N2 (N45)	2.06E+00 barG	n.a.	n.a.	Ar-N2 (96.1-3.9)	485 and 486
2018-09-07 14:25:00	2018-09-08 16:40:00	Ar-N2 (96.1-3.9)	2.07E+00 barG	CO2 (N48)	2.08E+00 barG	Ar (N45)	3.70E+00 barG	Ar-CO2-N2 (97.24-0.21-2.55)	487 After 20:10 the manometer was done for 2 h.
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2018-09-12 11:37:00	2018-09-13 21:20:00	Ar (N5)	1.96E+00 barG	n.a.	n.a.	n.a.	n.a.	Ar (100) 3bar	506 **Analysis sheet: here** ?
2018-09-13 21:29:00	2018-09-13 21:49:00	Ar (N5)	1.96E+00 barG	Ar (N5)	2.35E+00 barG	n.a.	n.a.	Ar (100) 3.4bar	509 ?
2018-09-13 22:01:00	2018-09-14 20:41:00	Ar (N5)	2.35E+00 barG	Ar (N5)	2.99E+00 barG	n.a.	n.a.	Ar (100) 4bar	509 ← good
2018-09-14 20:43:00	2018-09-15 09:01:00	Ar (N5)	2.99E+00 barG	CO2 (N48)	3.02E+00 barG	n.a.	n.a.	Ar-CO2 (99.25-0.75)	512 and 513
2018-09-15 09:03:00	2018-09-15 22:22:00	Ar-CO2 (99.25-0.75)	3.00E+00 barG	N2 (N45)	3.02E+00 barG	n.a.	n.a.	Ar-CO2-N2 (98.75-0.75-0.50)	514

beam stop unknown

RHUL data taking