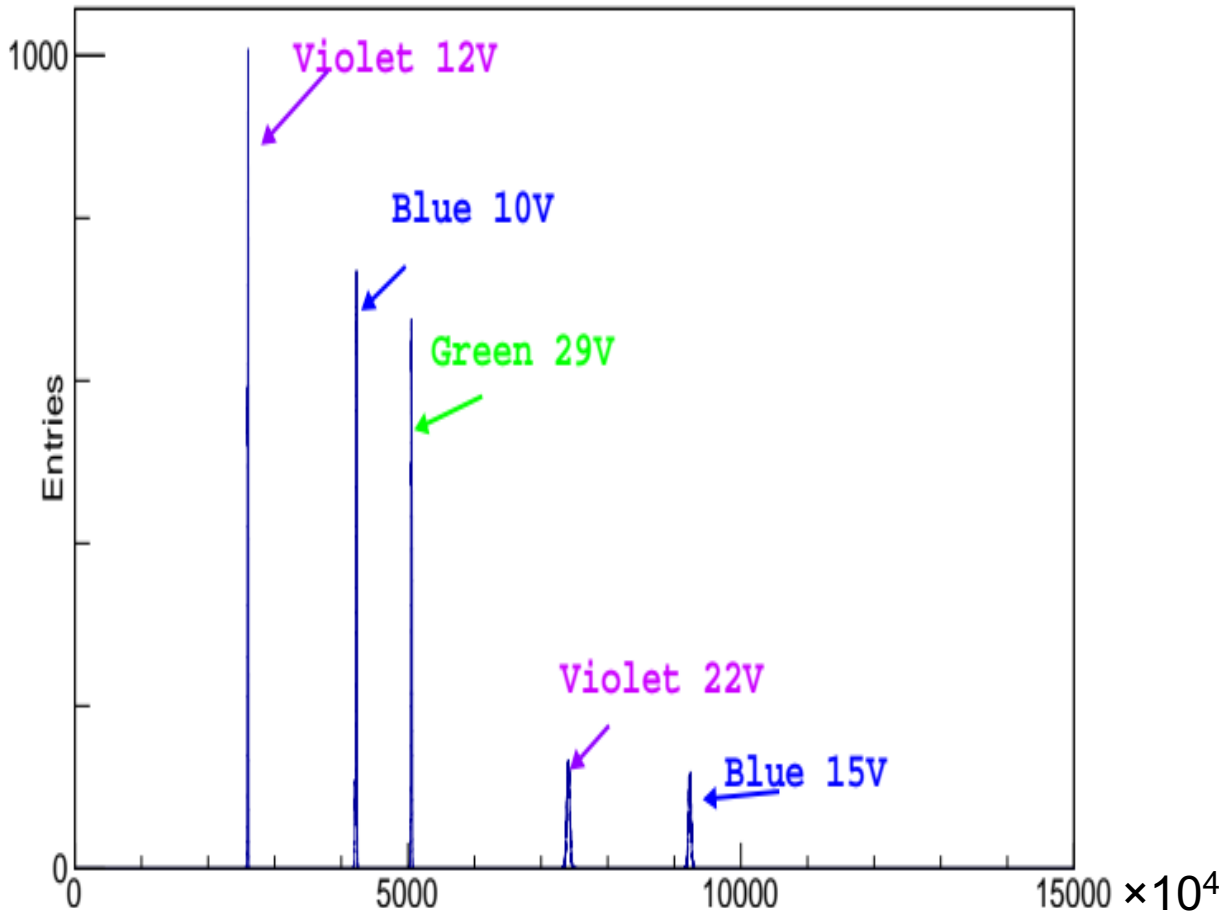
Identification of FCAL Bad and suspicious channels

- Out Line
- FCAL Channel status
- ADC normalization procedure
- Normalized ADC integral vs Channels for different LED colors
- Suspicious channels
- Location of these suspicious channels on FCAL
- Fully working programs for identifying bad and suspicious FCAL channels.

FCAL channel status

- LEDs are used to check the channel status.
- We have 3 LED colors with different voltages.
- We analyzed FCAL LED events for every run separately.

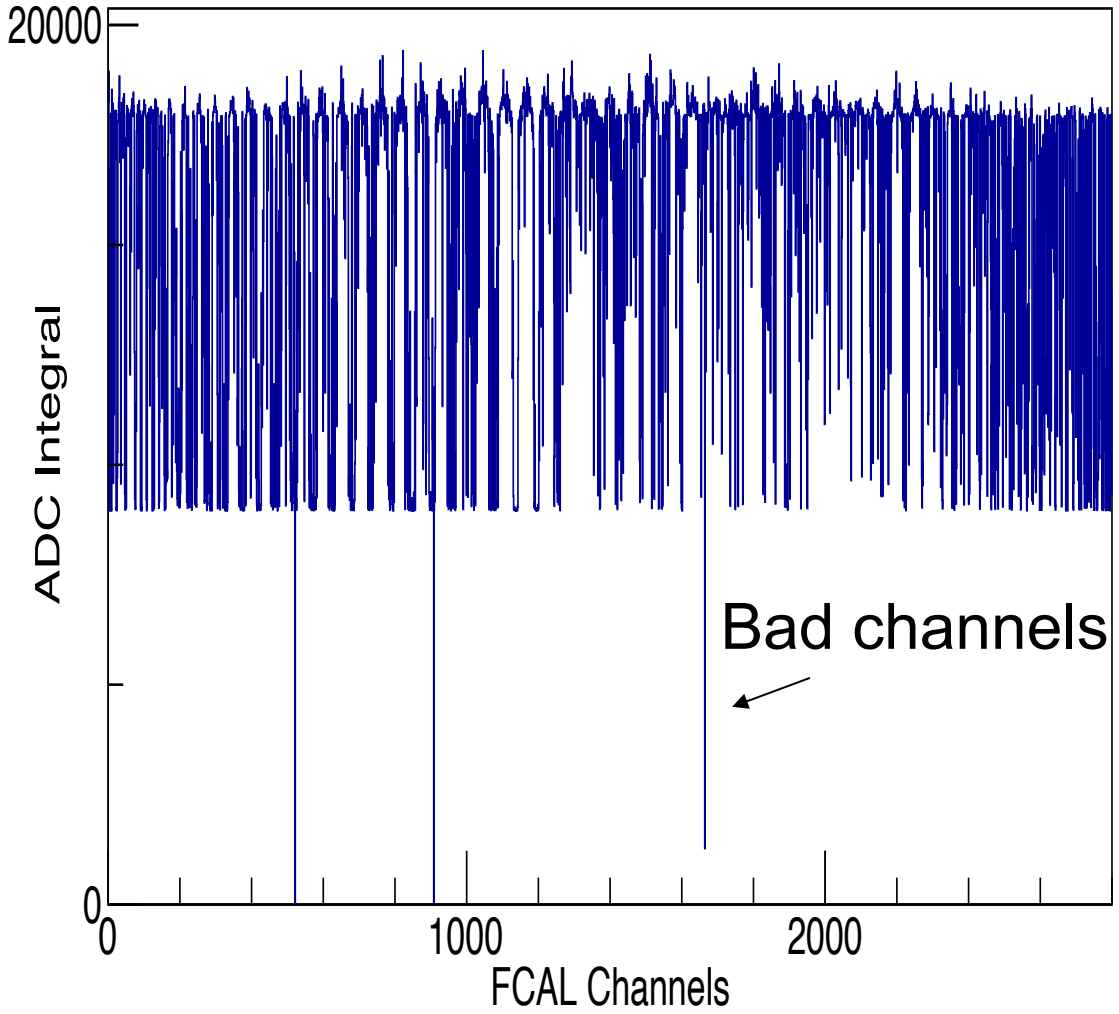


Sum of FCAL ADC integrals for all channels for LED trigger event

- Location:

/w/halld-scifs17exp/home/chandra/build/halld_recon/src/plugins/Analysis/fcalbadchannelschandra/JEventProcessor_fcalbadchannelschandra.cc, .h files

- Based on ADC response bad channels were assigned status value 1. Check all LEDs for all channel.



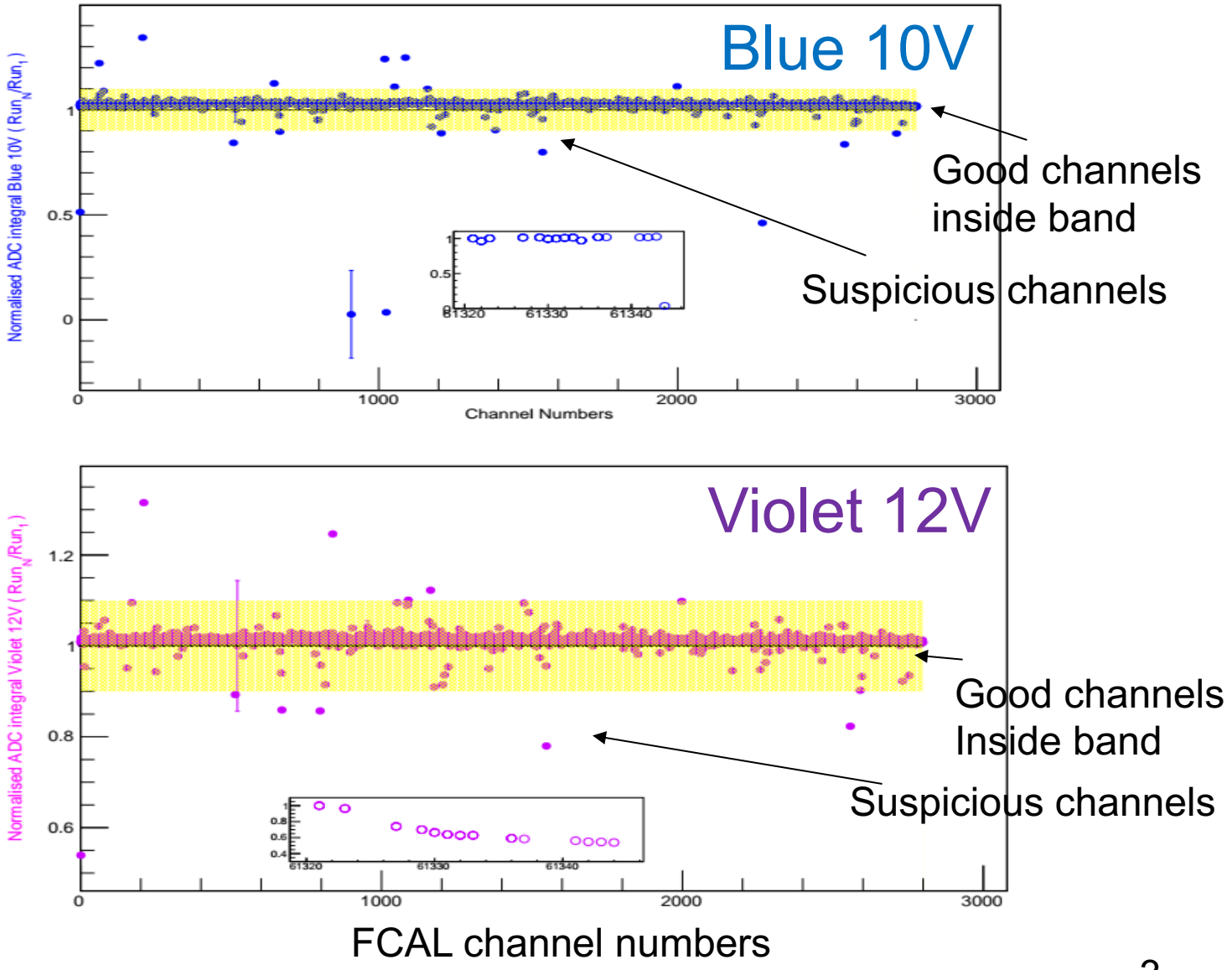
ADC normalization procedure

1)Once we have ADC integrals for all channels for all regions.
2)Fit (Gaussian)the ADC integral for all channels for all regions.
3)Get the peak position and fit width.
4)Get number of peaks in ADC integrals. We should have one pedestal and one ADC peak corresponding to one LED color.
5)The fitting has two status : accurate or failed.
6) Check if the status is failed, reason?
7)Repeat these steps to all LED colors and all Runs.
8)Once we have all the information, calculate the Normalized mean = ADC mean for last run/ ADC mean for first run. Do this for all channels and corresponding error in normalized mean.
9)Plot the normalized mean vs Run numbers and select the normalized range (band) for further analysis. I chose 10% as an acceptable band.
10)Plot the FCAL 2D plot and geo-graphically mark the channels outside the band for all LED colors.

Normalized ADC integral vs Channels for different LED colors

- Normalized ADC integral is defined as Last Run ADC integral over First Run ADC integral.
- Normalized ADC integral versus FCAL Channels for Be Target.
- Channels whose normalized ADC integral is outside 10% band are marked as suspicious.

Be Target



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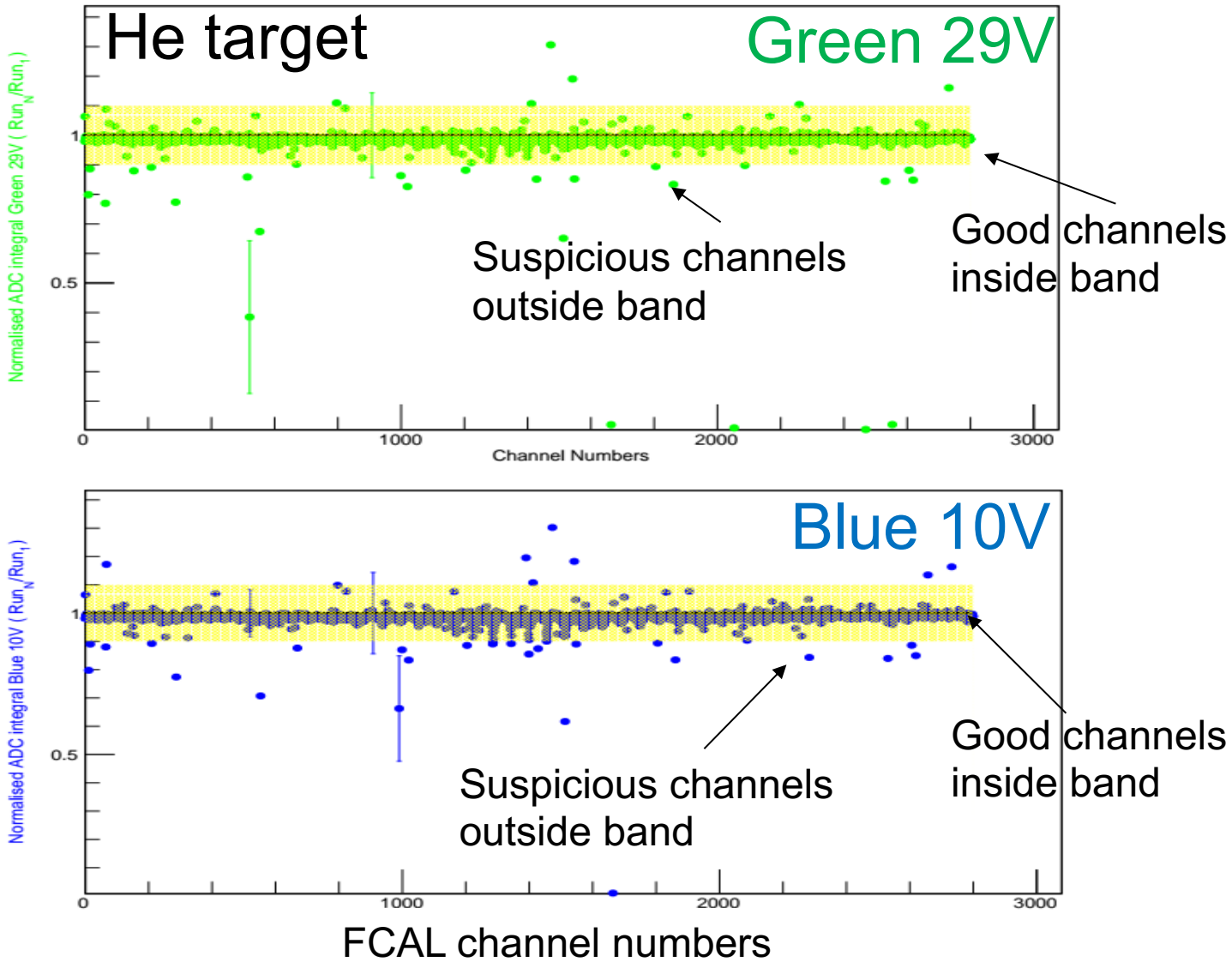
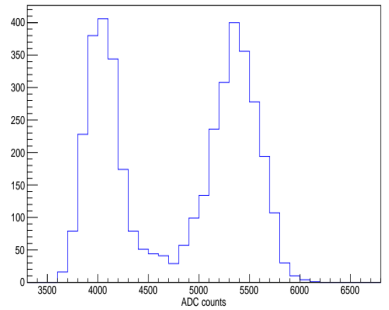
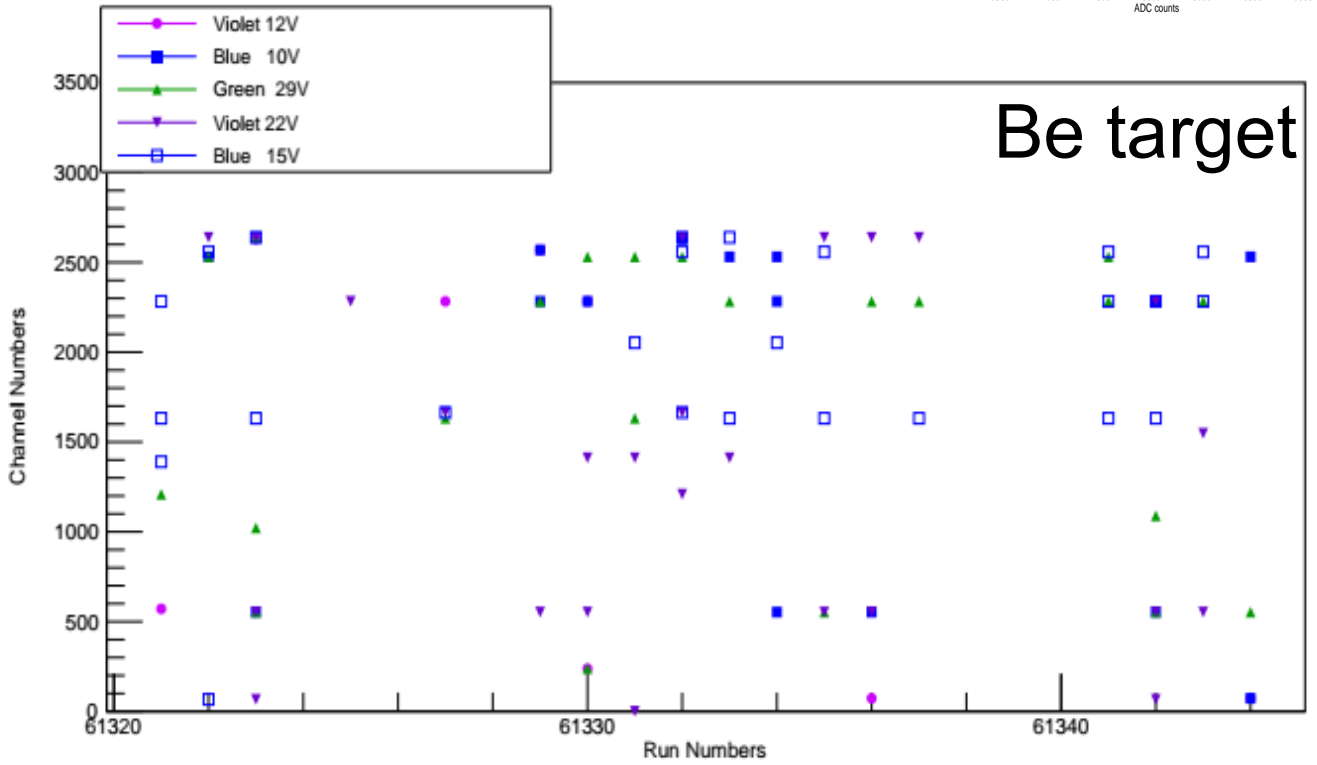


Channels with double ADC peak vs Be Runs for all LEDs

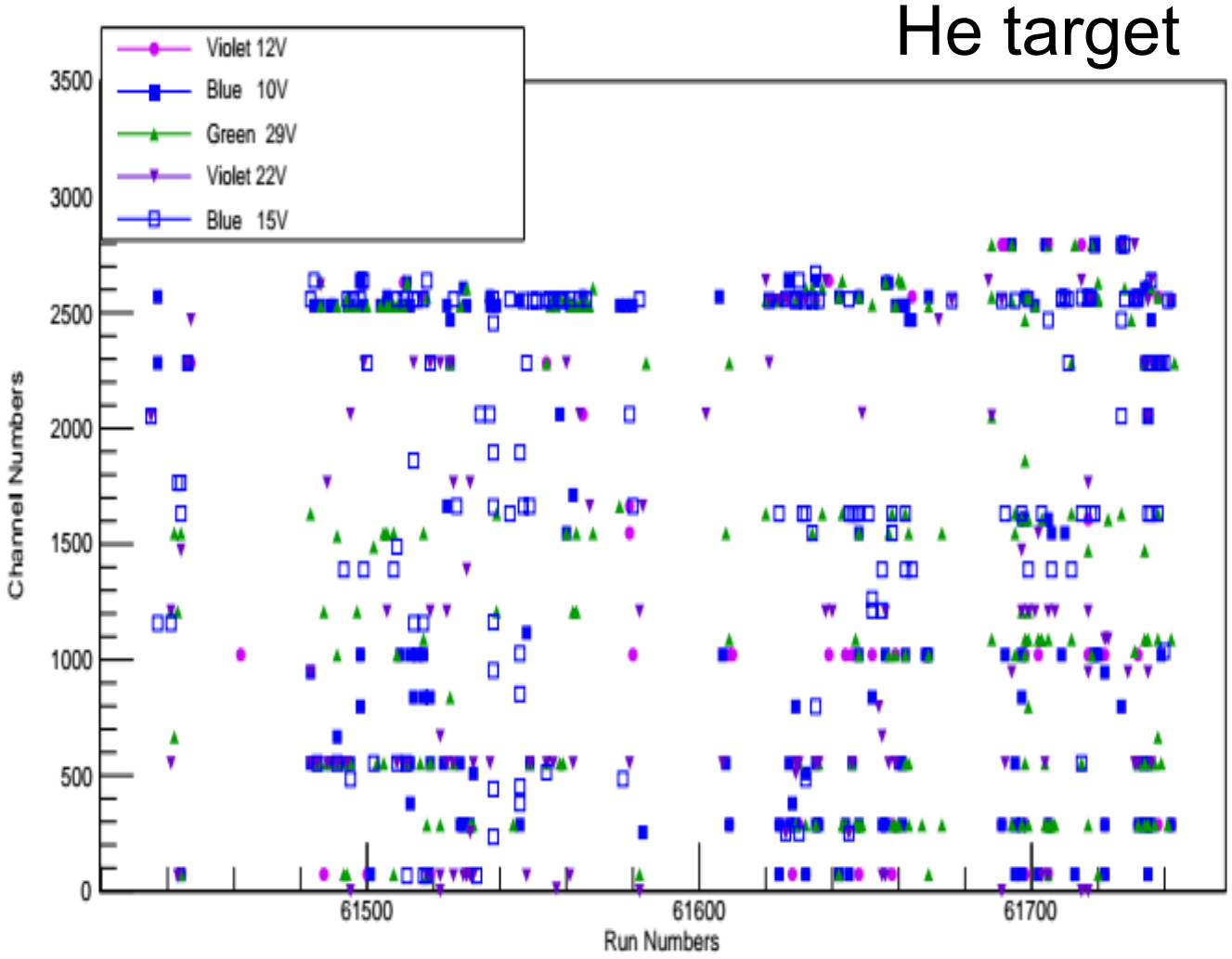
- Channels which ADC spectrum has double peak are also marked as suspicious for that particular run.
- Reason for double peaks : Drop of high voltage or ?





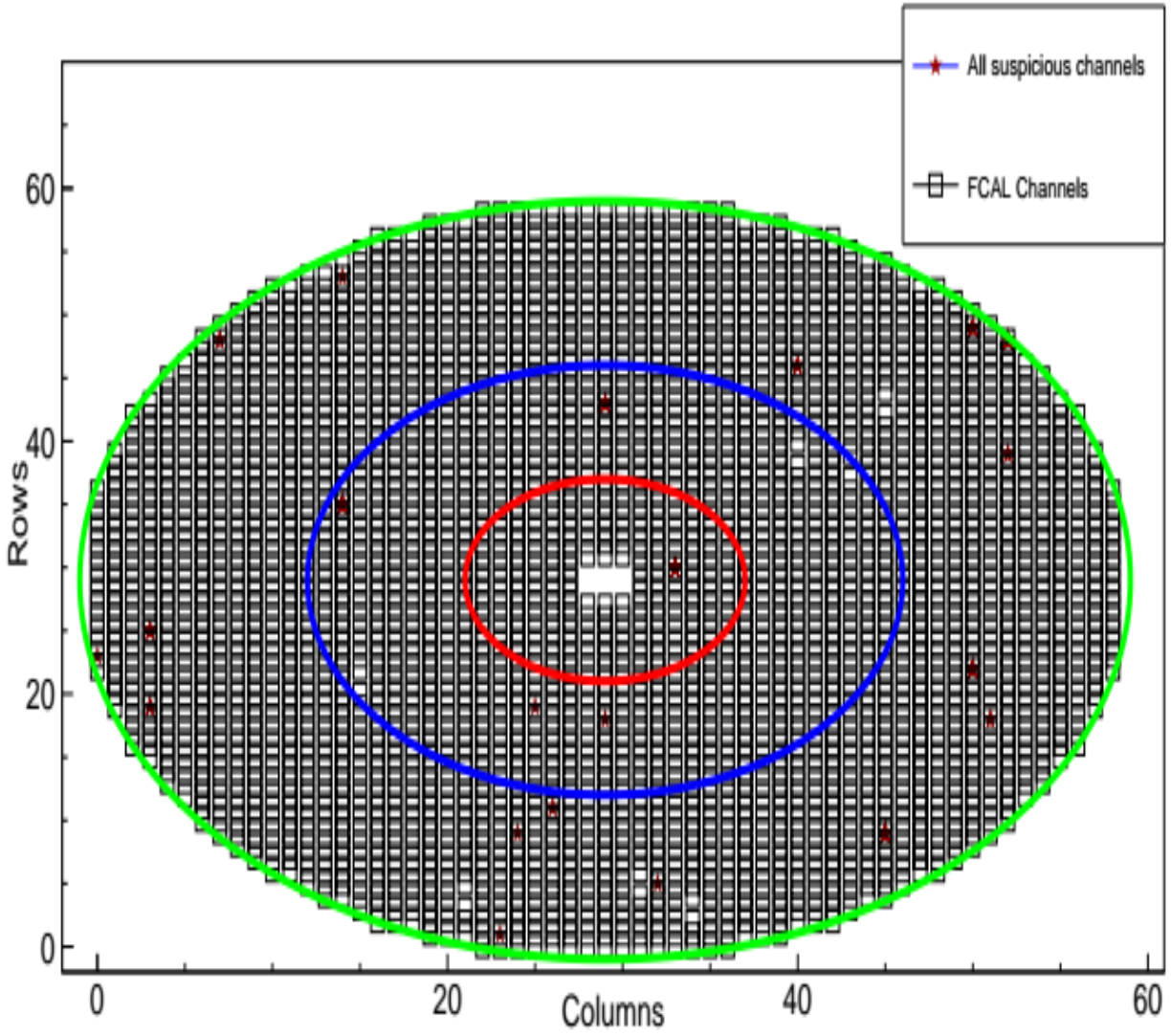
Channels with double ADC peak vs He Runs for all LEDs

- Channels which ADC spectrum has double peak are also marked as suspicious for that particular run.
- Reason for multiple peaks: Drop of high voltage or ?



Suspicious channel location on FCAL (Be Target)

- Based on the analysis of normalized ADC integral and ADC peak structure, suspicious channels were selected and assigned status value 5 in CCDB.



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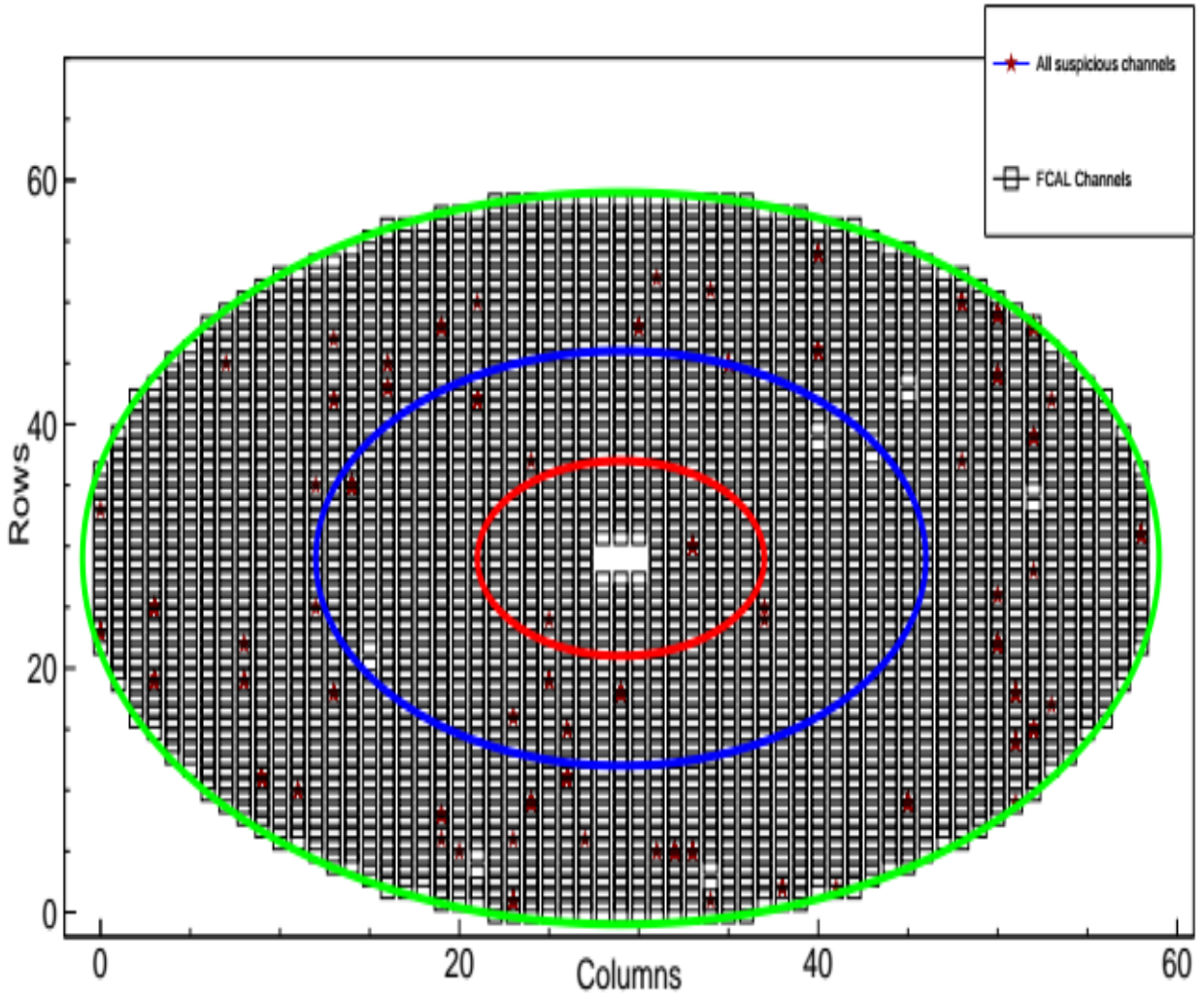

https://github.com/JeffersonLab/hd_utilities/tree/master/fcalchannelfits

- ADCinteVsRunNumbers.C. is to calculate normalized ADC integral for each the run number

- BeRunsOCT21.C. Is to calculate normalized ADC integral, # ADC peaks for each LED color and for different targets. Randomly I selected the FCAL regions (3 color rings in slides 10 and 11, you can select your own regions).