

# Production Ladder Classification

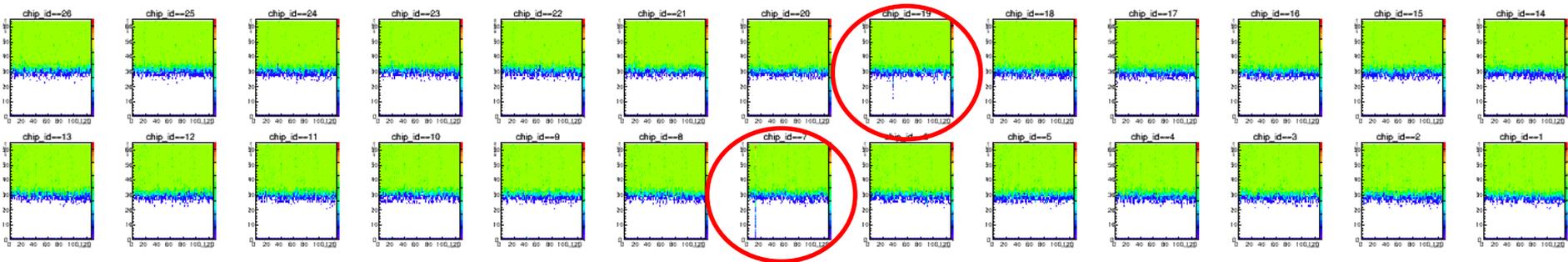
## Bad Channel Selection

**Rachid Nouicer, Milan Stojanovic**

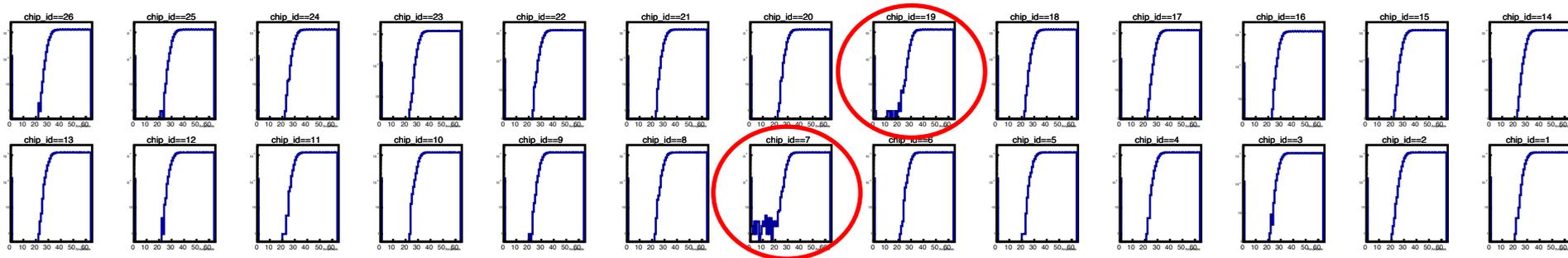
# Amplitude vs channel for each chip

Ladder: PPB2-L2S

Bias 100V, DATA: 20210312-1036\_0,2



Y projection (log scale)



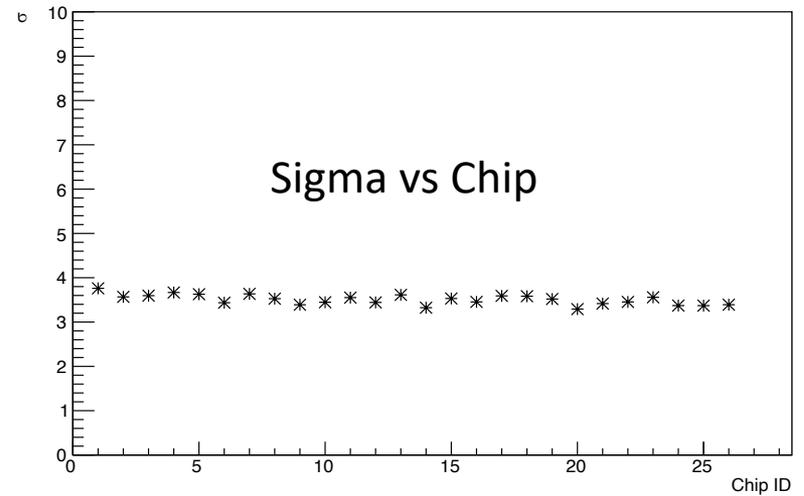
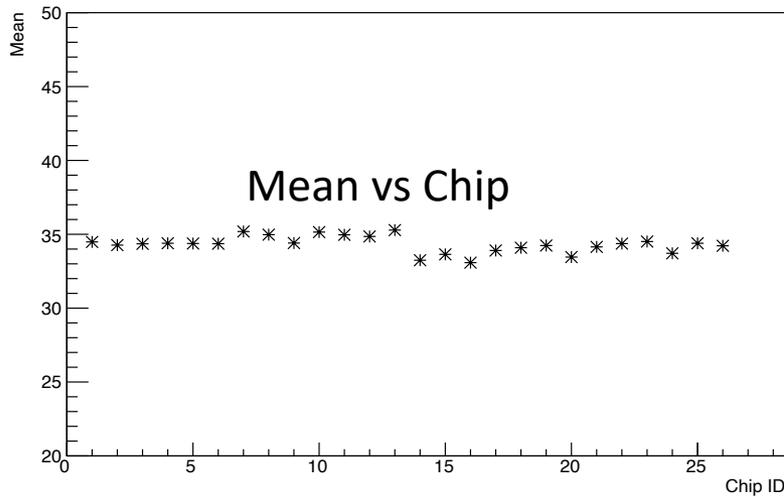
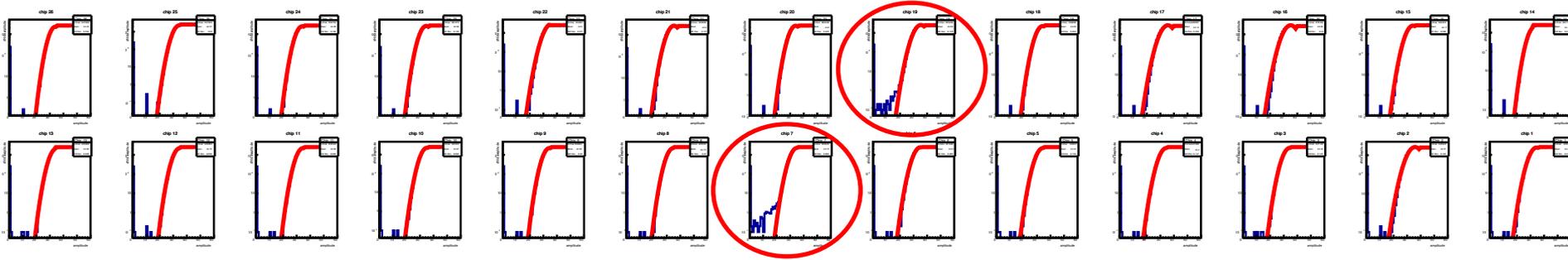
# Number of events needed

Main idea is to look in every single channel.

1 Run  $\sim$  1.2M events – Not enough to fit every single chip

20 Runs  $\sim$  25M events

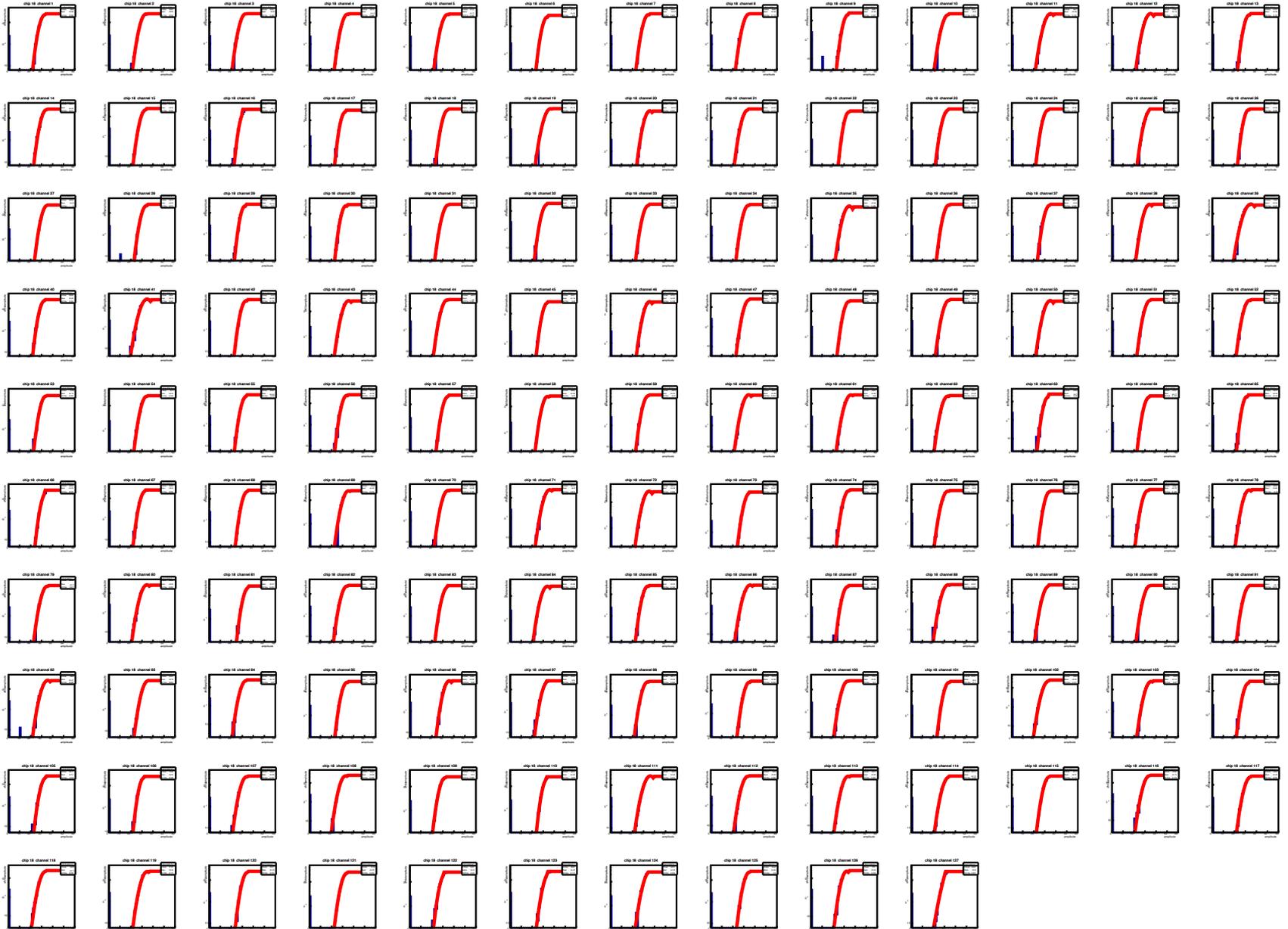
# Fit results for each chip



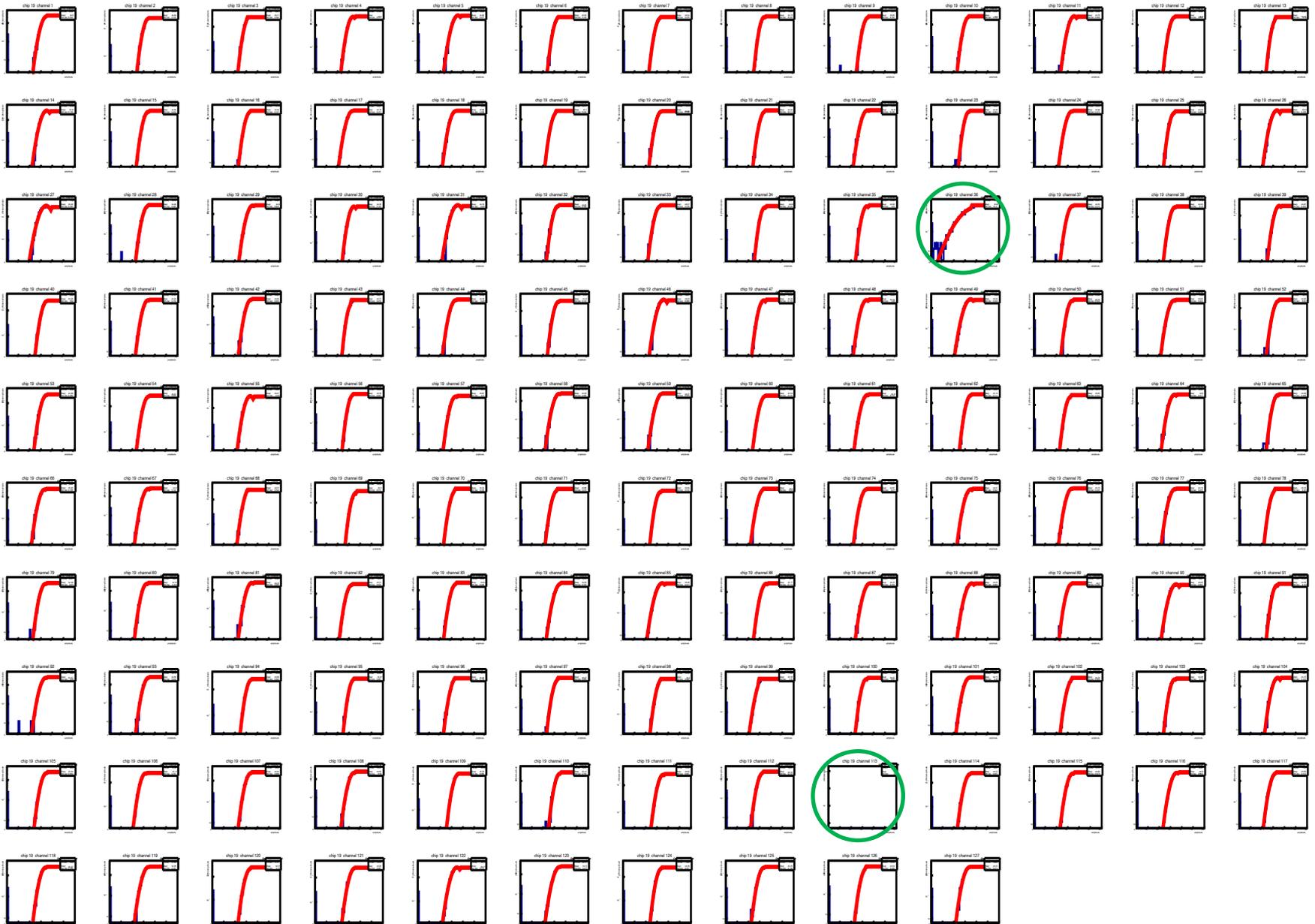
Fit function:

$$f(x) = \begin{cases} \text{Gaus}(x, \text{mean}, \text{sigma}), & x < a \\ \text{const}, & x \geq a \end{cases}$$

# Good chip - U18 fit for each channel

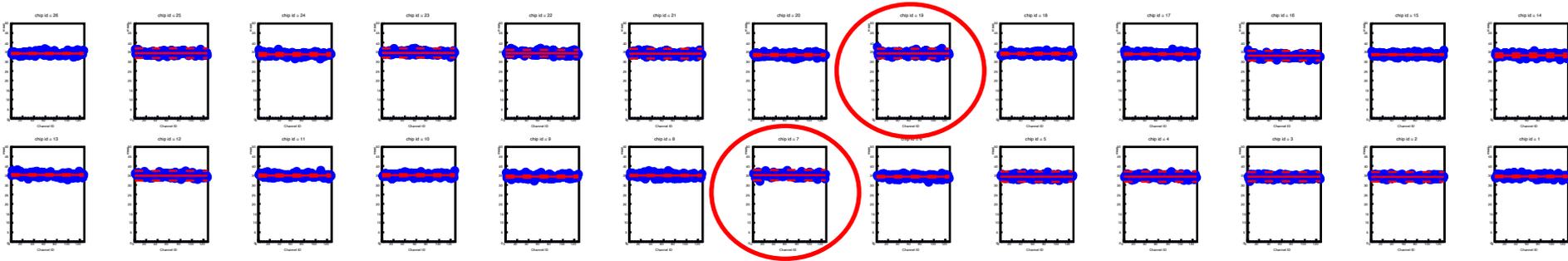


# Chip with bad channels U19 fit for each channel



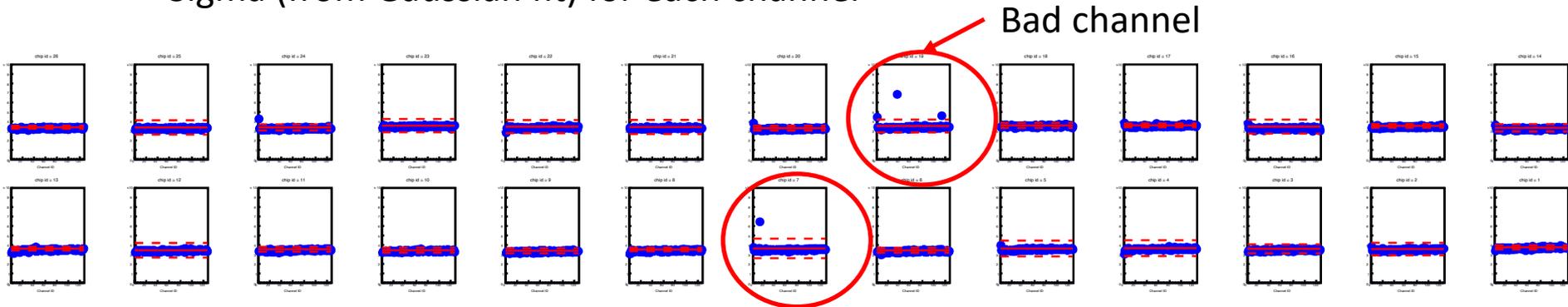
# Fit results for U19 & U16

Mean (from Gaussian fit) for each channel

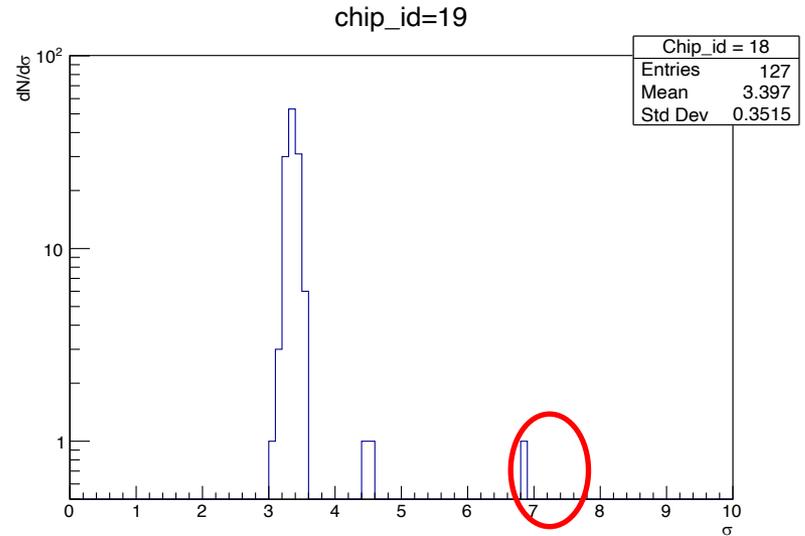
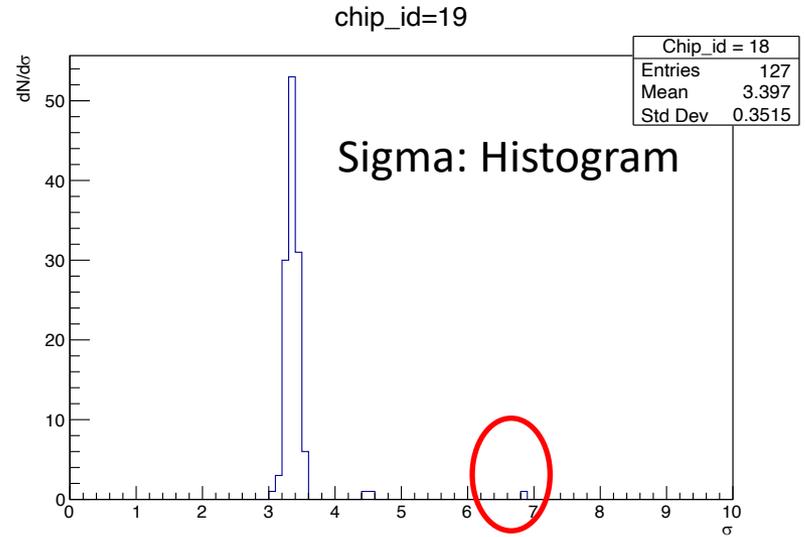
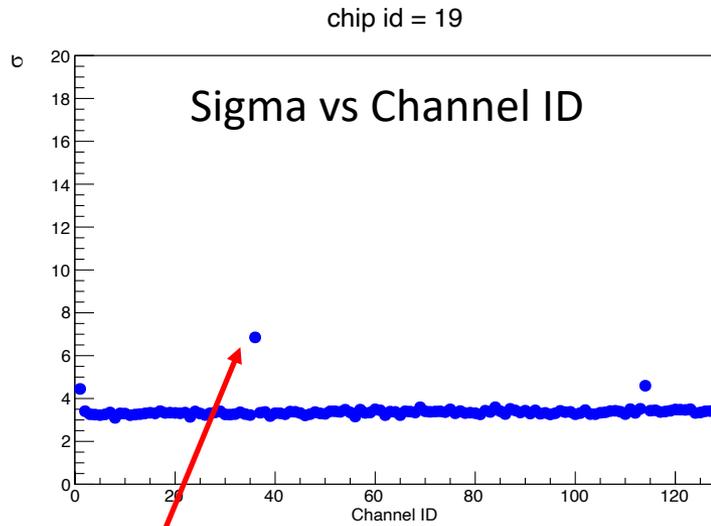


Red lines – Mean/Sigma from the fit of the whole chip  $\pm 5 * \text{uncertainty of the fit}$

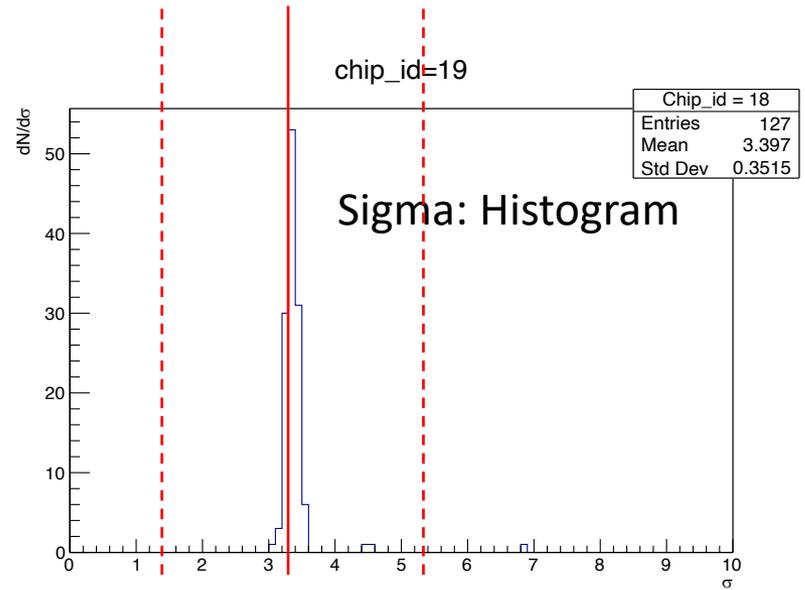
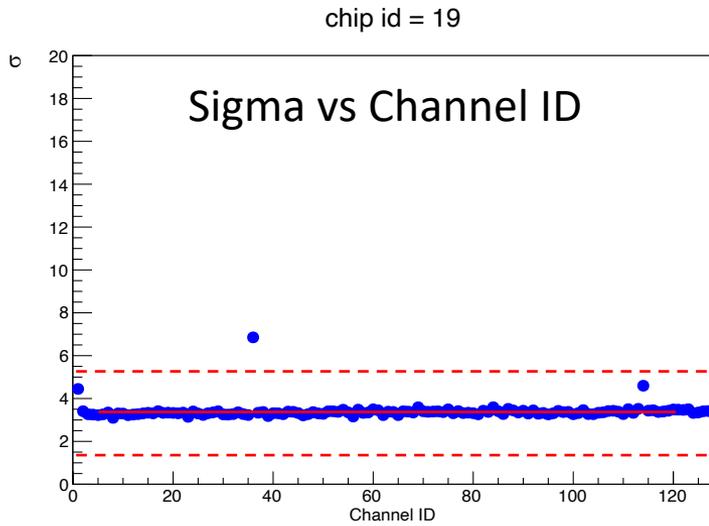
Sigma (from Gaussian fit) for each channel



# Chip with bad channel U19

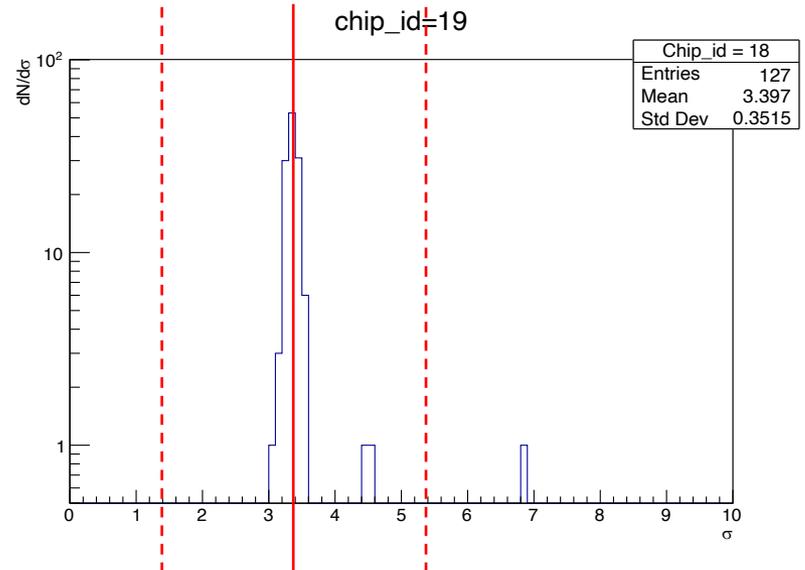


# Chip with bad channel U19



Standard Deviation

$$\sigma = \sqrt{\frac{\sum (x_i - \mu)^2}{N}}$$



# Conclusion

Procedure: If sigma of the channel is  $\pm 8$  std dev away from sigma of the chip --> Bad chip

```
-----  
root [0]  
Processing dead_channel_check.C...  
  chip U7 channel 12   BAD!  
  
  chip U19 channel 36   BAD!  
  
  chip U19 channel 113  BAD!  
  
Totally there are 3 bad channels, which is 0.090854%% of the half ladder.  
[root [1]  
[root [1]  
[root [1]
```

The channels that we saw by the eye, are coming out from the macro as well!

**Classification: By the percentage of the bad channels.**

# Backup

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