# Ecal MIP Analysis
## Progress Report

2/28/20

Hannah Harrison Univ. of Kentucky

# Last Update

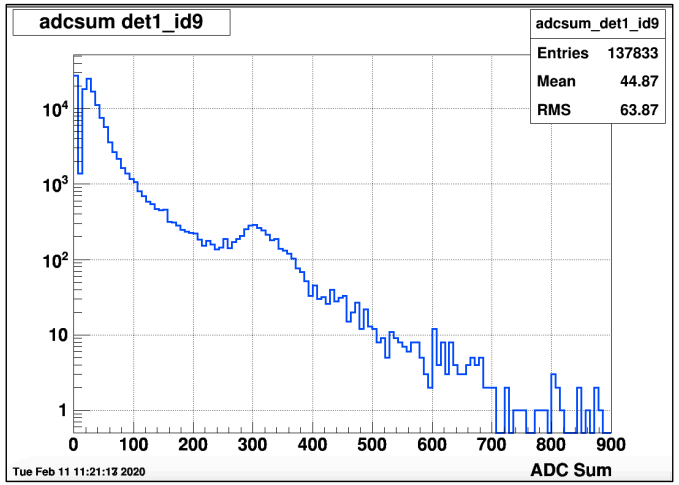
## MIP Optimization

- Minimum trigger bias data set

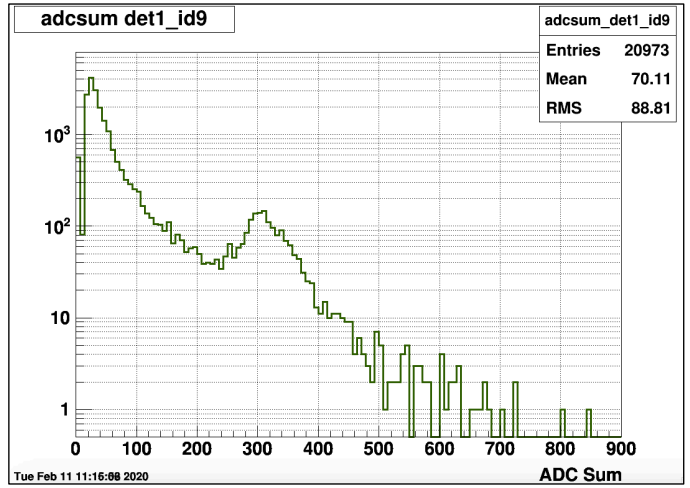
/gpfs01/star/subsysg/FPS/fcs2019/event/liangxl/gain0015_...

- Ecal cluster cuts
  - #towers/cluster = 1
  - #neighbors/cluster = 0
- Hcal energy cut
  - $E_{Hcal} > 6$ GeV

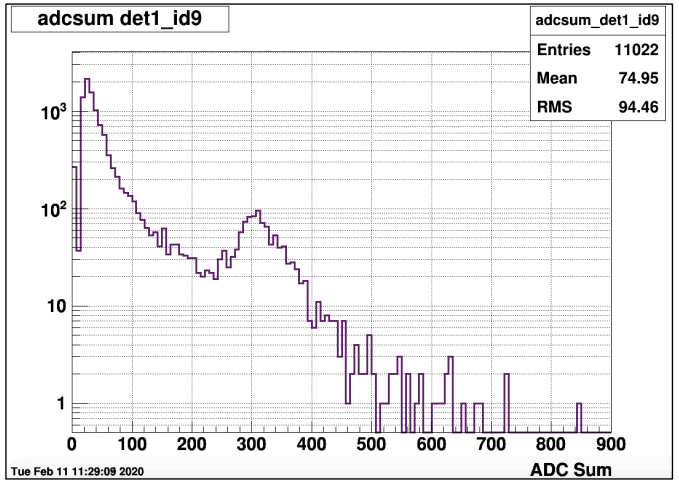
## "Good" MIP – ID#9



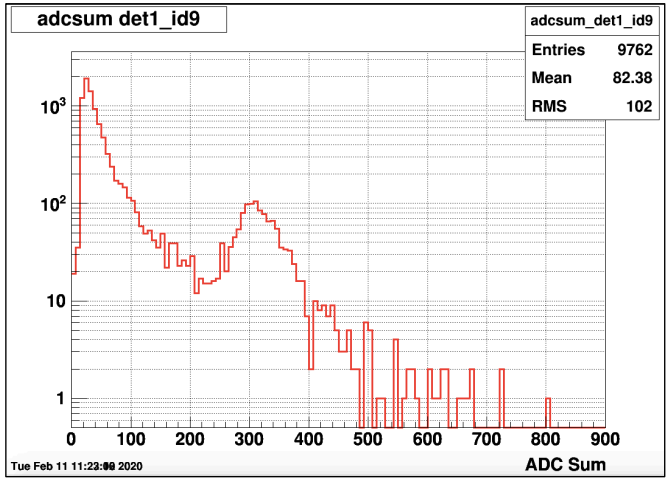

No Hcal Cuts



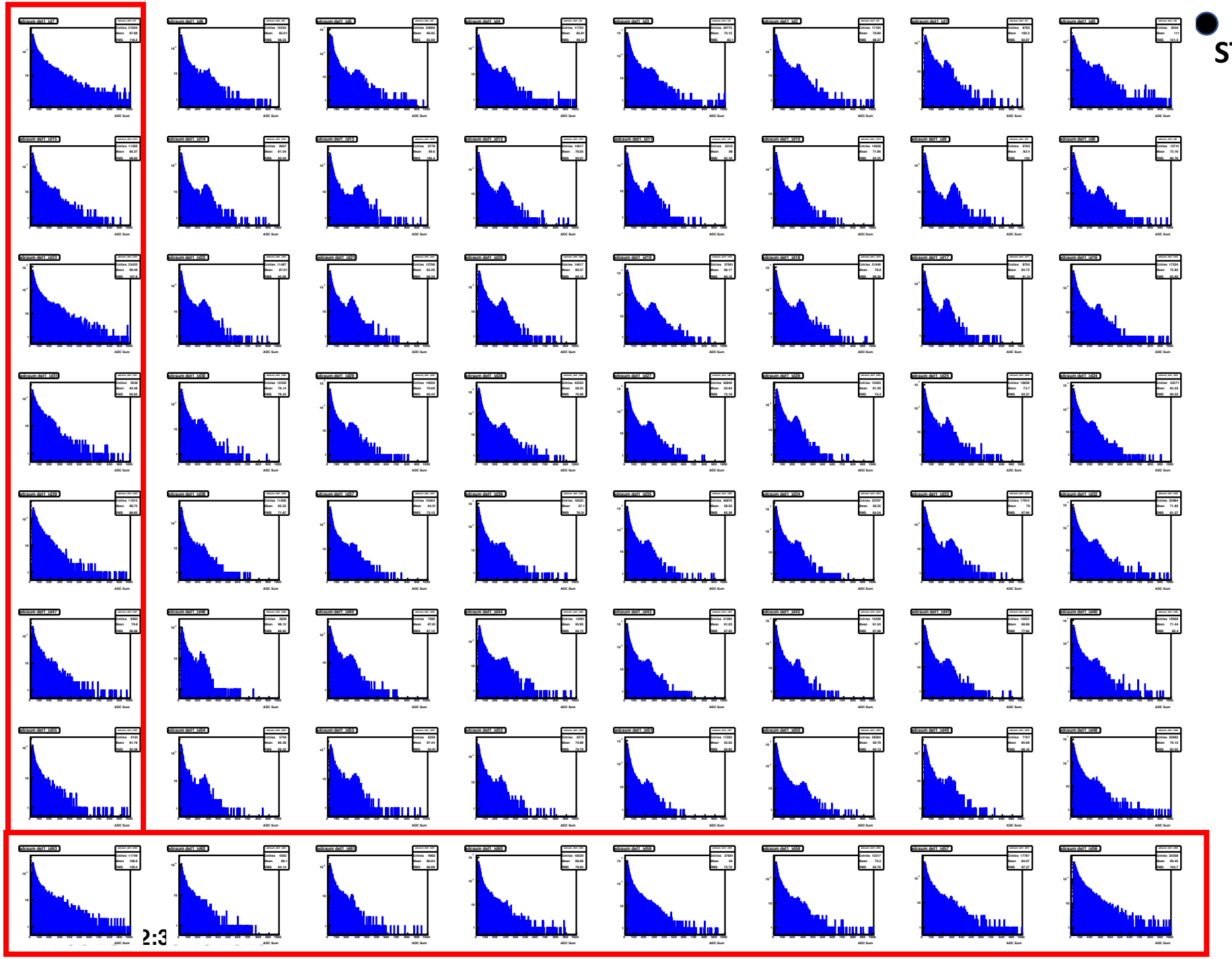

Only Hcal > 6 Cut




Only Hcal > 10 Cut




Hcal > 6 & DeltaRmin Cuts



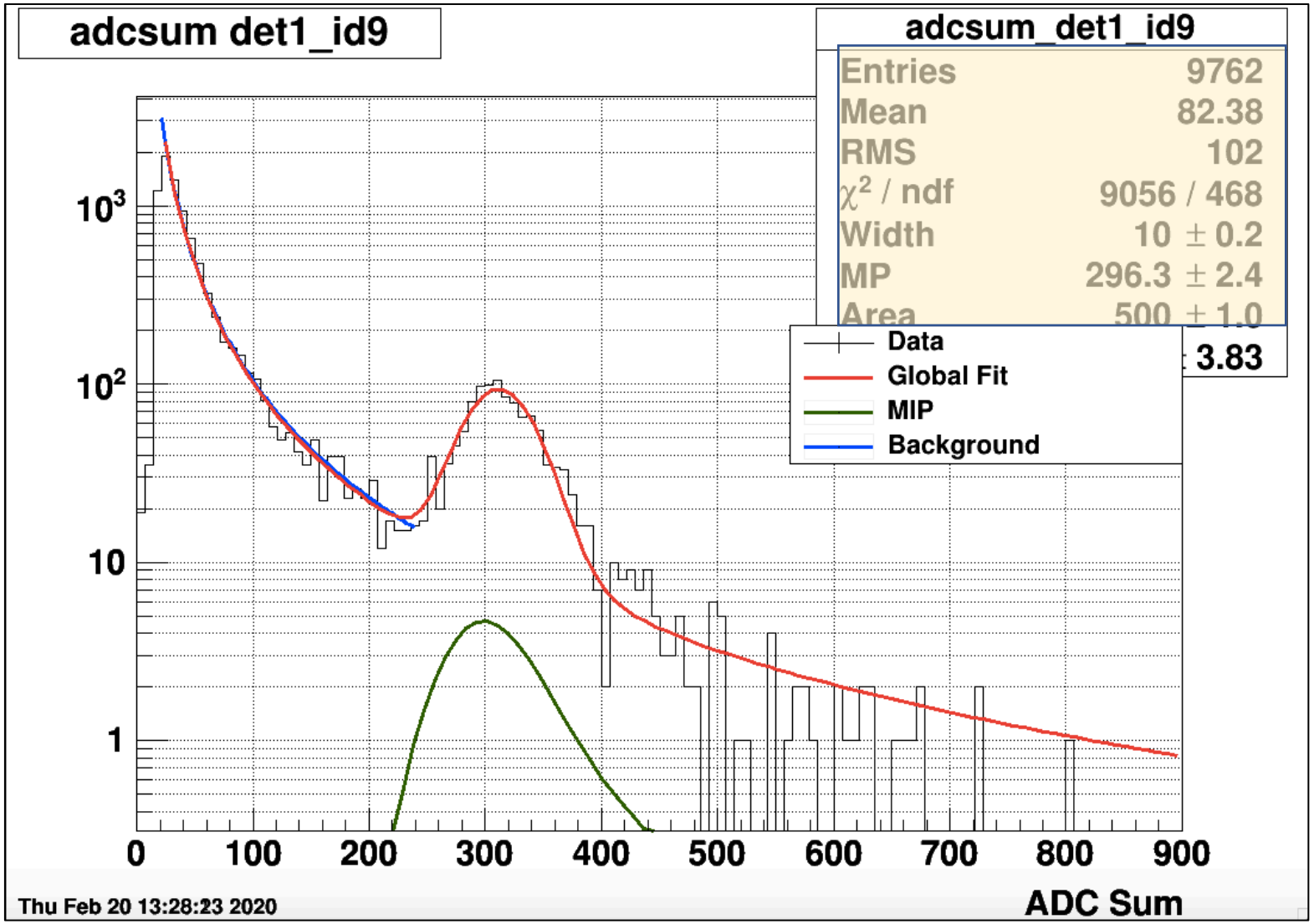
STAR coordinates
{0, 0}
Looking west

# MIP Fitting

- **Background**
  - $Ax^n$ (EM shower)
- **'MIP' Convolution**
  - Gaussian (SiPM Response)
  - Landau (MIP)
- **Global Fit**
  - Parameters extracted from background & convolution

**Global $\chi^2/ndf$: 1.347**
**Most Prob. Val: 273.96**

**Note: Fit params are for convolution only**



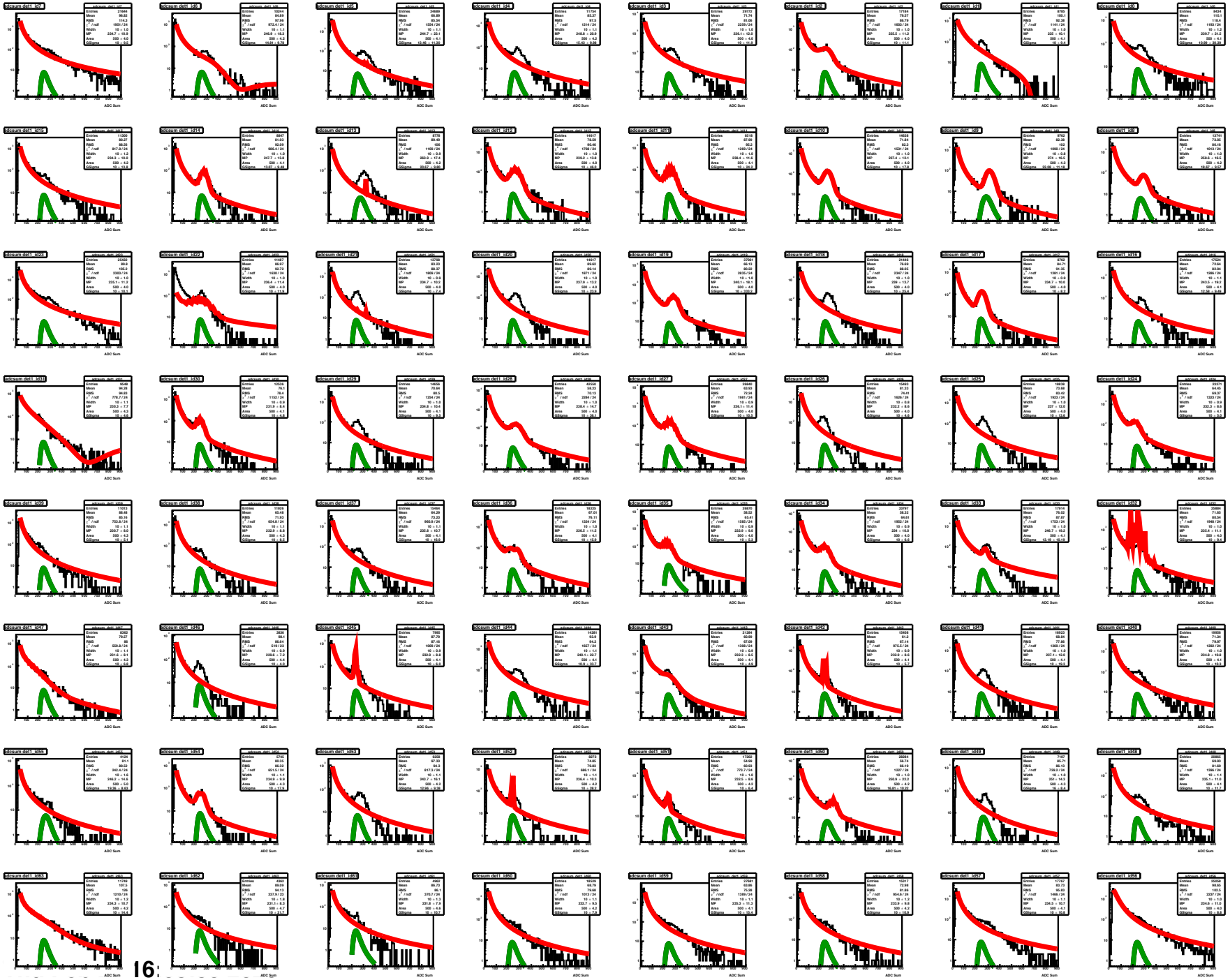

* Many functional forms were tried here; see backup slides for examples

**Fit Range**

$x$={30,900}

Convolution

Global Fit



# MIP Fitting

## Fit Problems

- No fit range accurately fits *all* MIPs

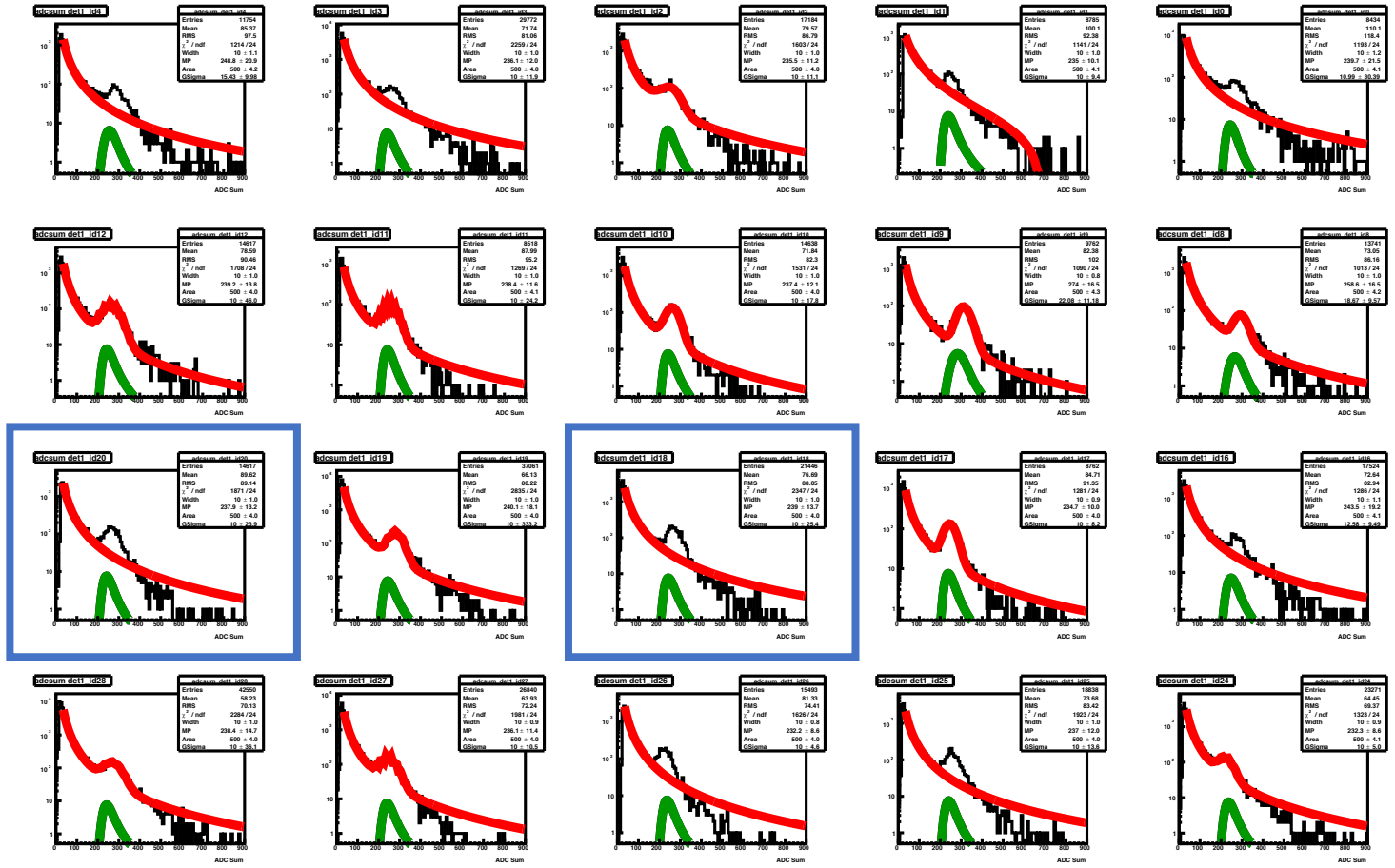
  x= {30,900)

  --- “Best” fit multiple MIPs

  --- Still “bad” fit for 15+ ID’s

  *(i.e.)* ID #20, #18

- Can use different fit ranges for different ID’s, but not ideal for further studies/gain correction.

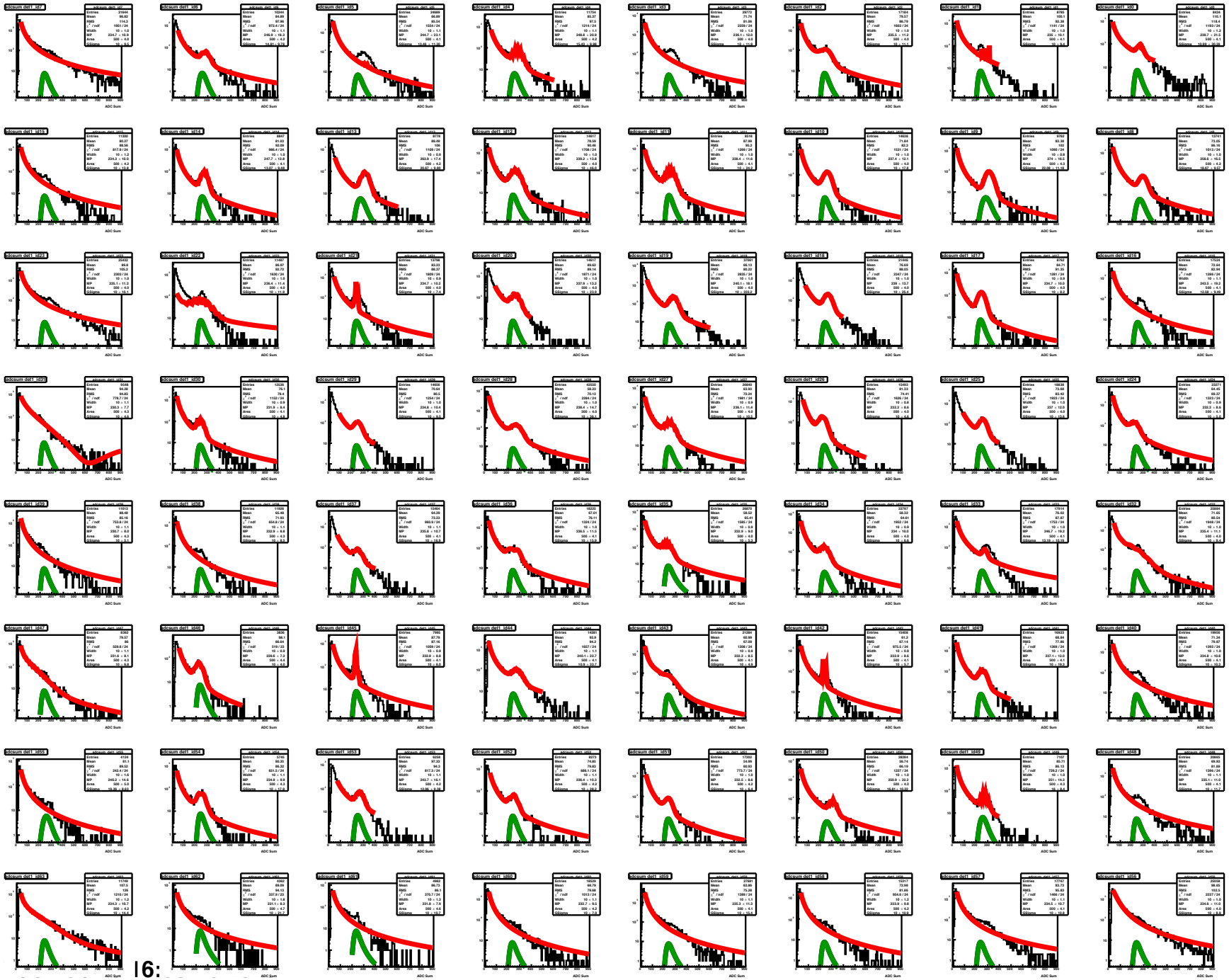


**Fit Range**

*various*

Convolution

Global Fit



16:

# Conclusions

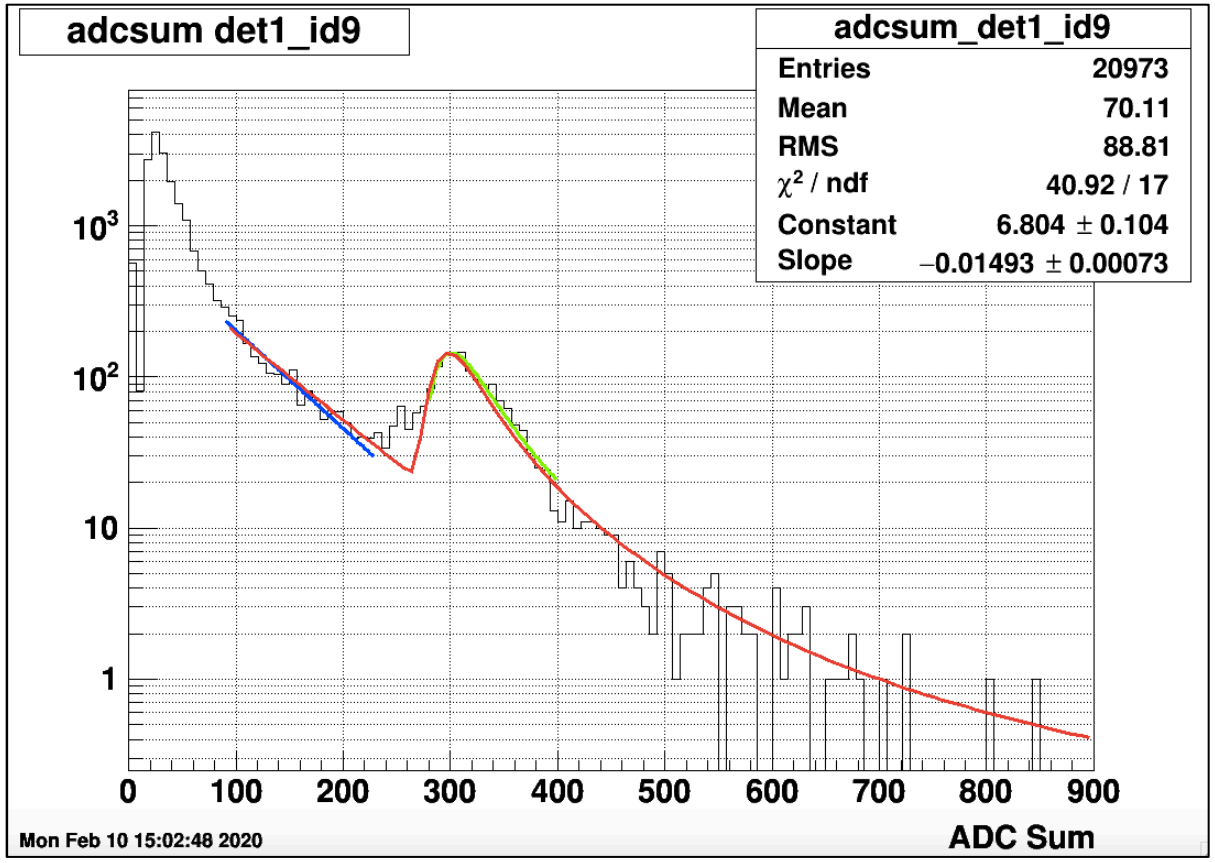
- MIPs are best fit with convolution of Landau+Gaussian.
- MIP fits should be fine-tuned to more accurately fit all ID’s.

## Next Steps

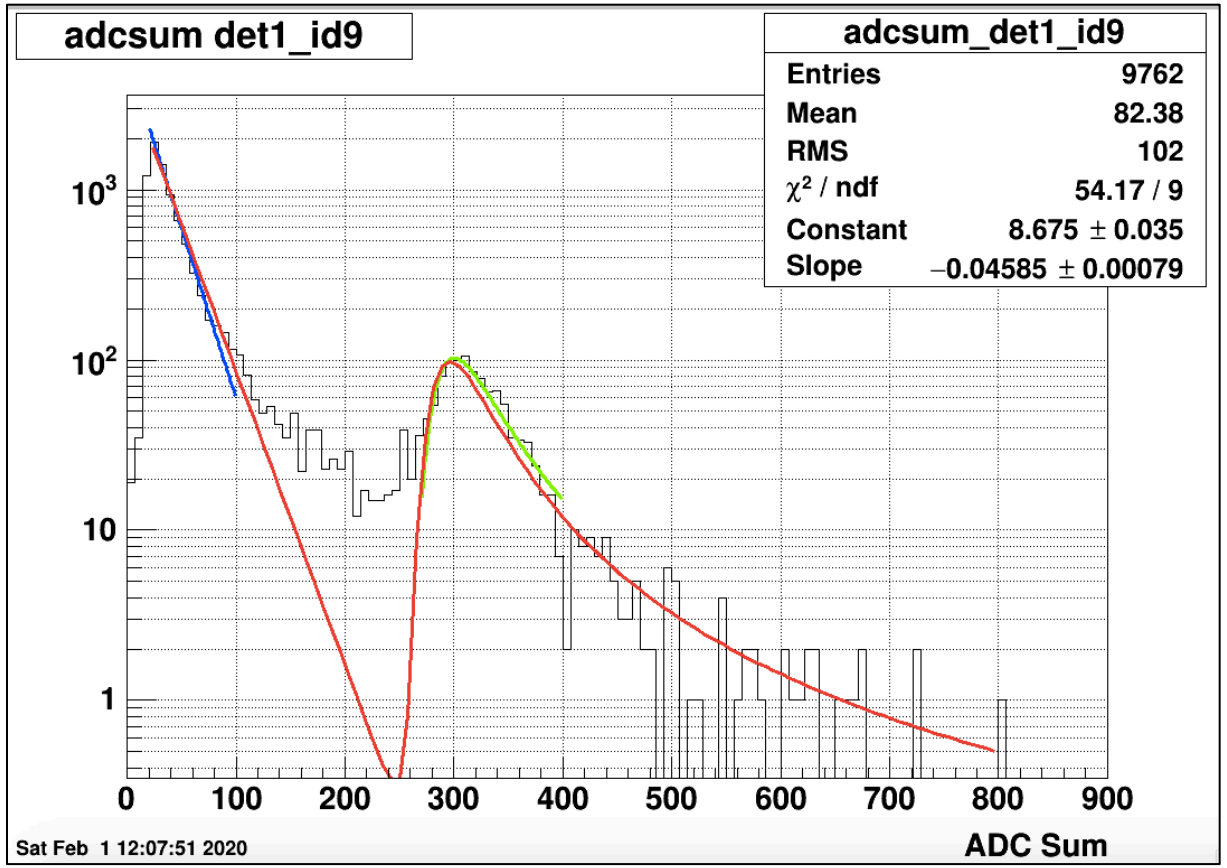
- Currently working to iteratively optimize fit ranges.

Backup Slides:

# Other Attempted Fits



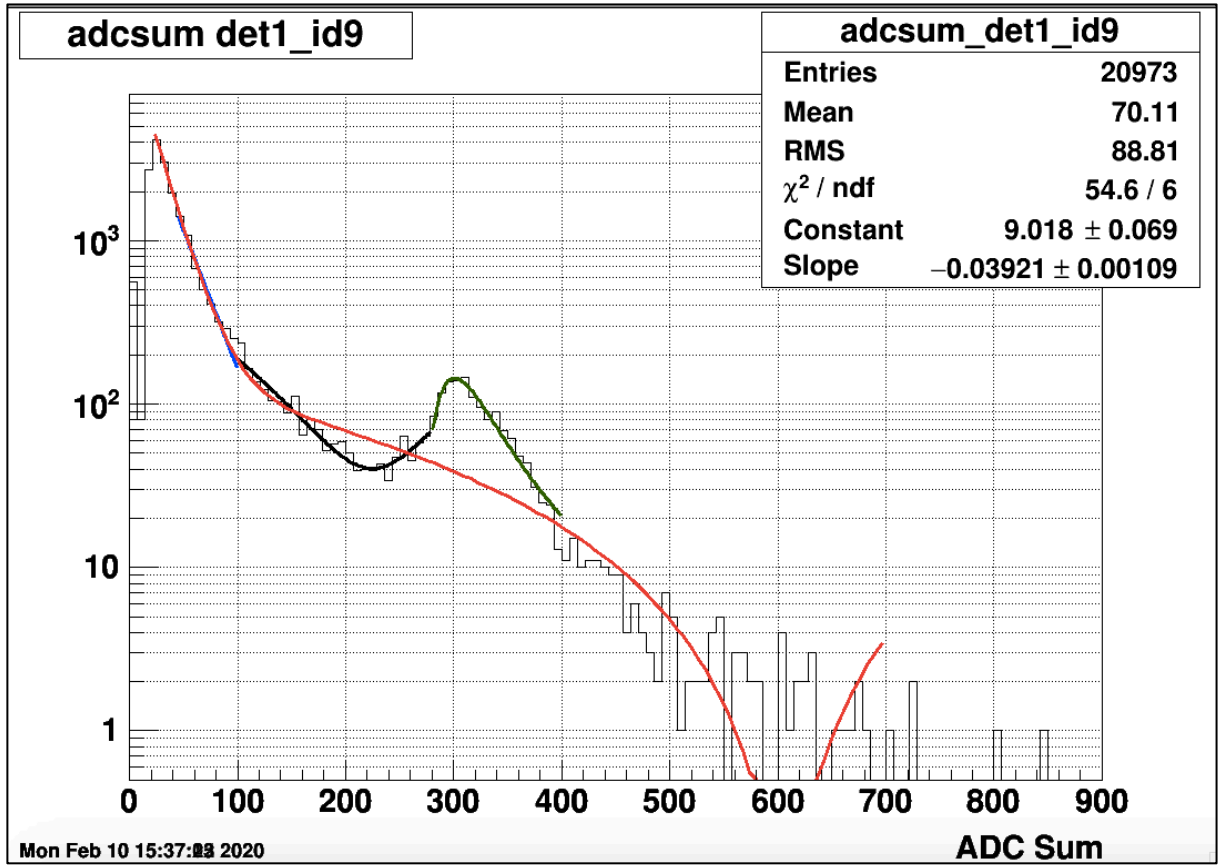

Exponential + Landau

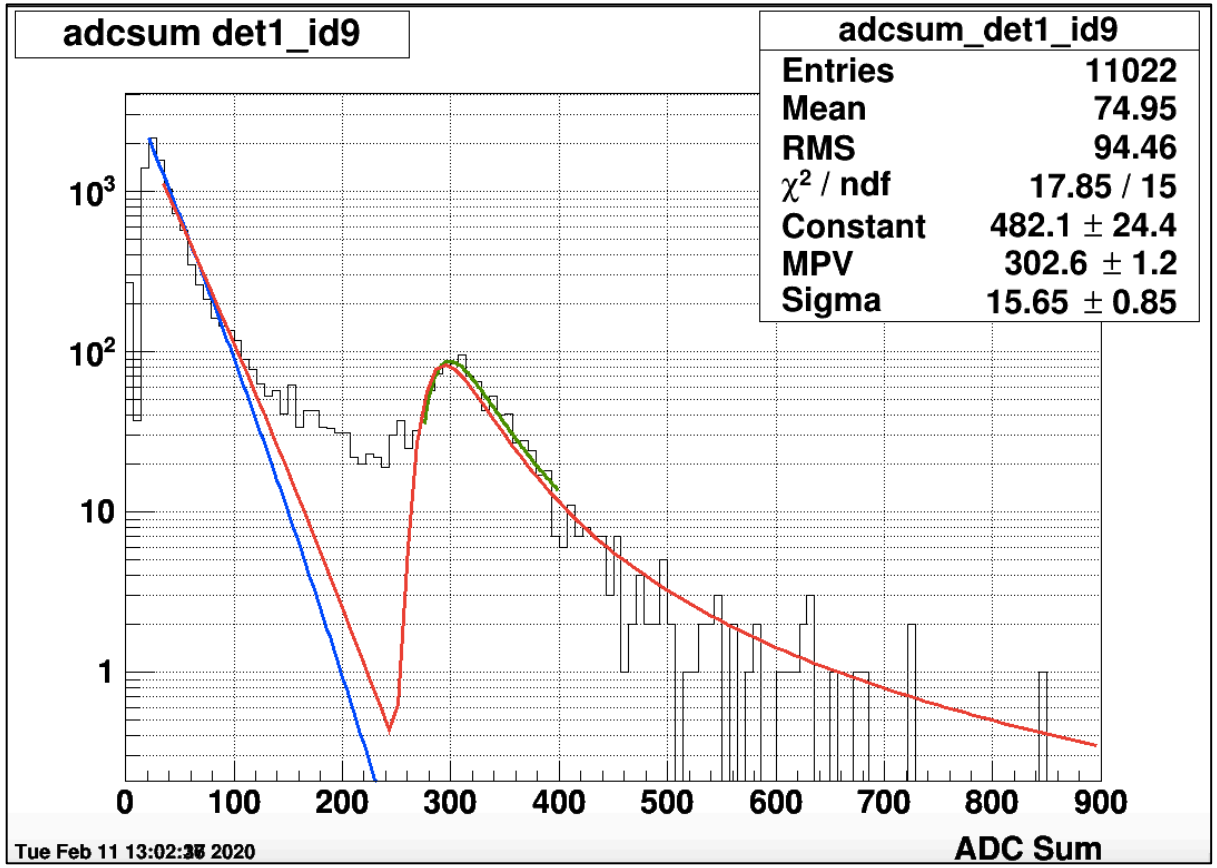



Exponential + Landau

Backup Slides:

# Other Attempted Fits




Exponential + 2nd Order Polynomial + Landau

Gaussian + Landau