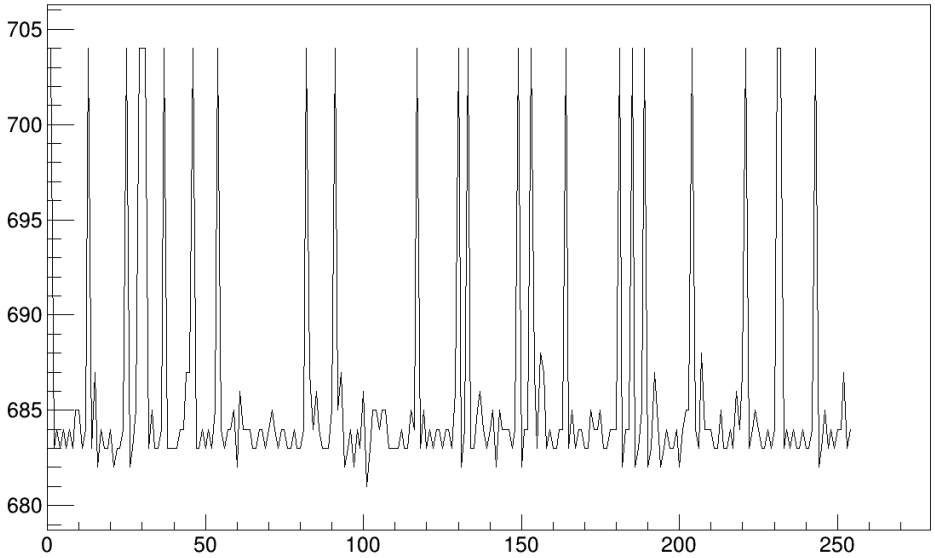
35t Status Update

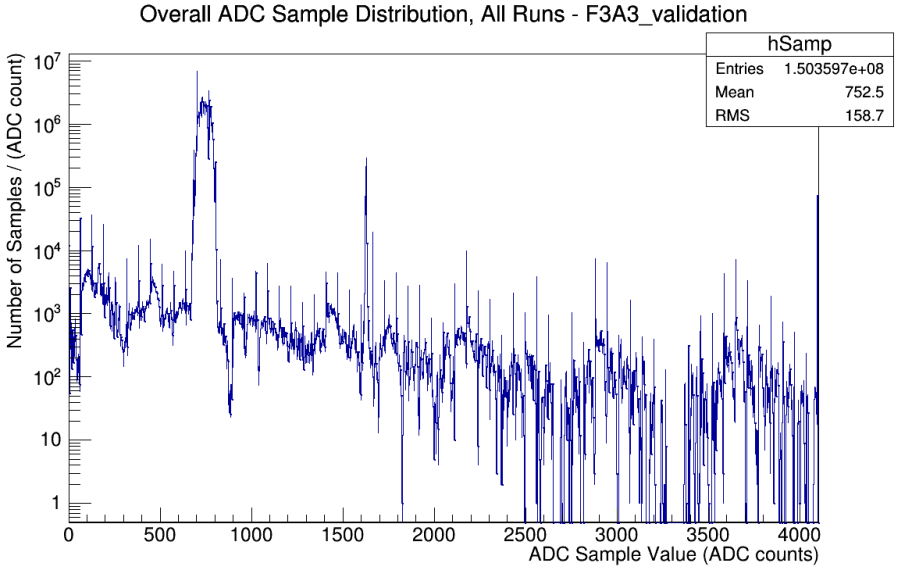
BNL DUNE Meeting - April 29, 2015

35t FEMB Status

- Activities at BNL:
  - Finishing up FE board validation
  - 4 FEMBs sent to Fermilab to date
  - 8 more to be sent imminently
  - Still debugging last 4 FEMBs, **critical path**
- Activities at Fermilab:
  - Ongoing tests of first APA in D-Zero assembly building
  - Flange board still problematic
    - Needs additional reworking
    - FEMB control cables need to be tested: calibration signal injection, JTAG programming, I2C interface
  - TPC readout completely integrated into DAQ, data readout works
- Upcoming tasks:
  - Finish FEMB validation and APA installation + checkout
  - Prepare for comissioning: channel map, online monitoring

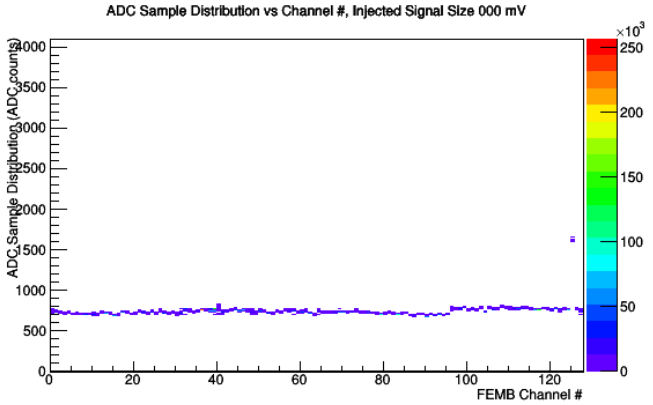
ADC Non-Linearity in FEMB Data

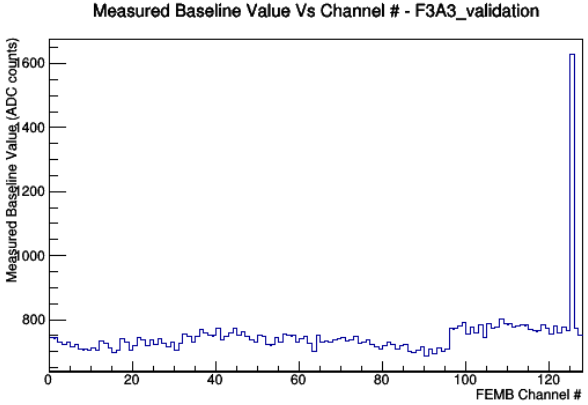


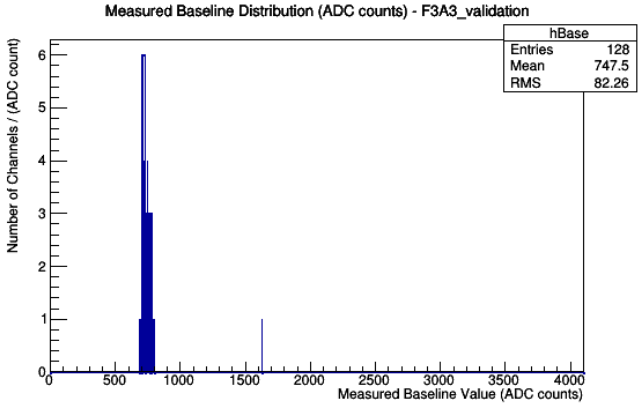


- Clearly have issue with 6 LSBs of 12-bit ADC, 6 MSBs are OK
- Need to think how to deal with this in data analysis

Baseline Measurement



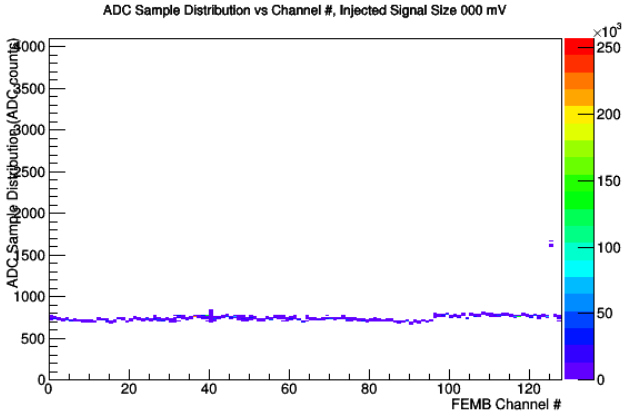


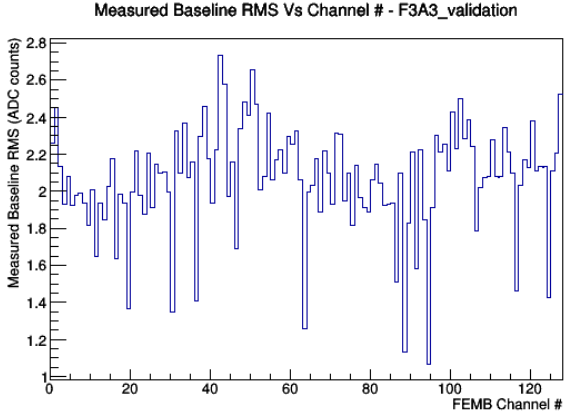


Baseline measured using data with no injected signal

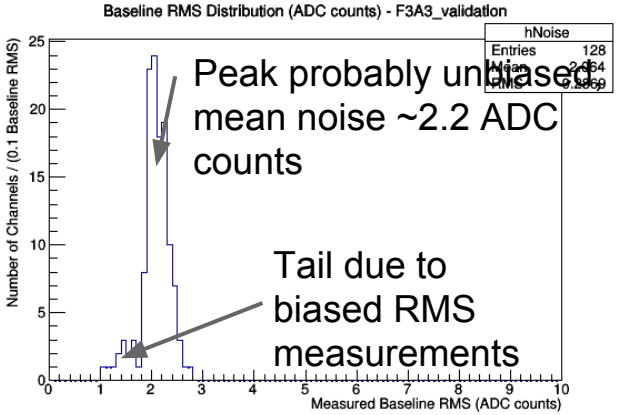
Need to exclude “stuck” ADC codes, straightforward

Noise Measurement





Noise (RMS) measurement low for certain channels after exluding stuck ADC codes

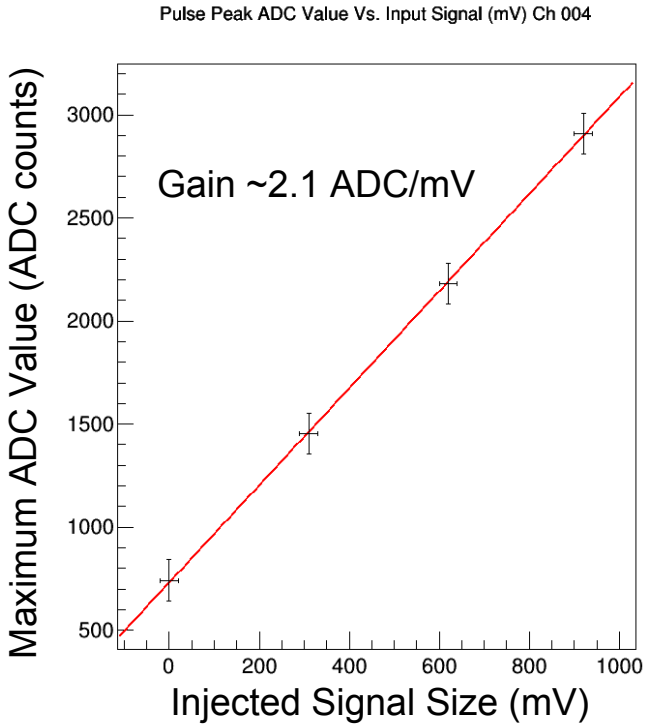


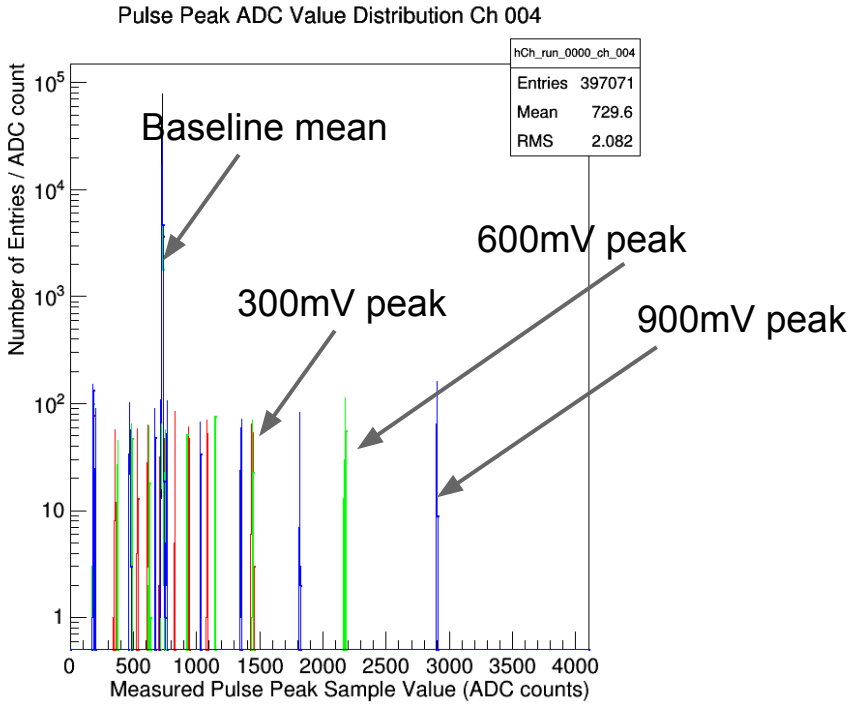
Noise measured as baseline RMS

Need to exclude “stuck” ADC does, biases RMS measurement lower

Overall FEMB channel noise distribution will have low tail, but peak probably OK

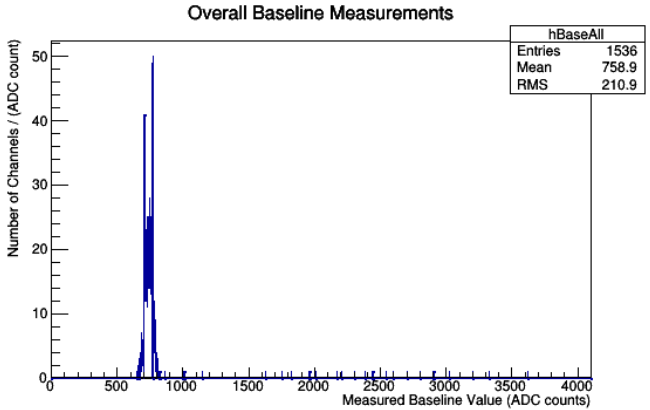
Gain Measurement

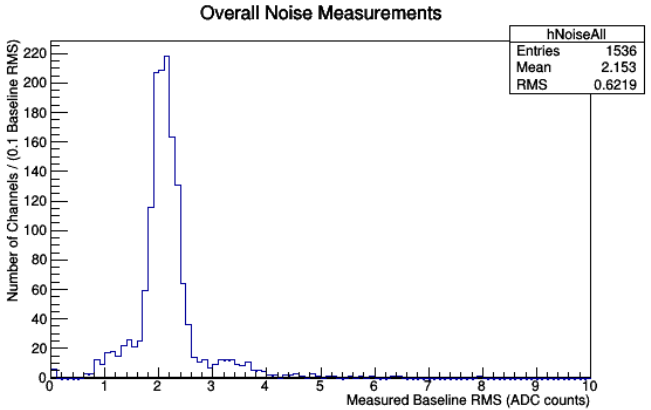


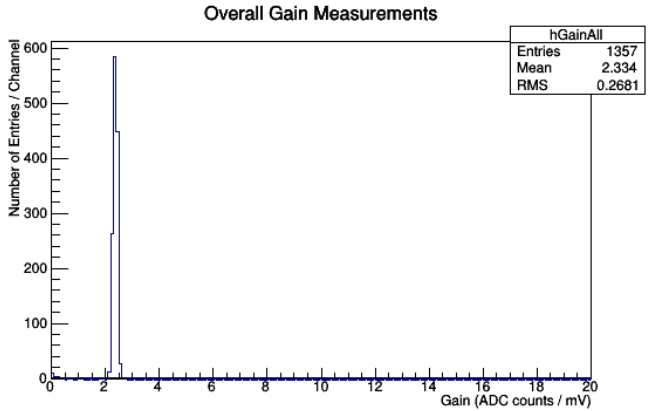


- Identify maximum ADC sample distribution on each channel for each injected signal size, corresponds to samples on pulse peak, estimate channel gain using linear fit
- Crucial to account for or exclude ADC non-linearity and saturation, otherwise fit is biased

Room Temperature Results







Mean Baseline = 759 ADC

Mean Gain = 2.15 ADC/mV

=11.7 ADC/fC

Mean Noise (RMS) = 2.1 ADC