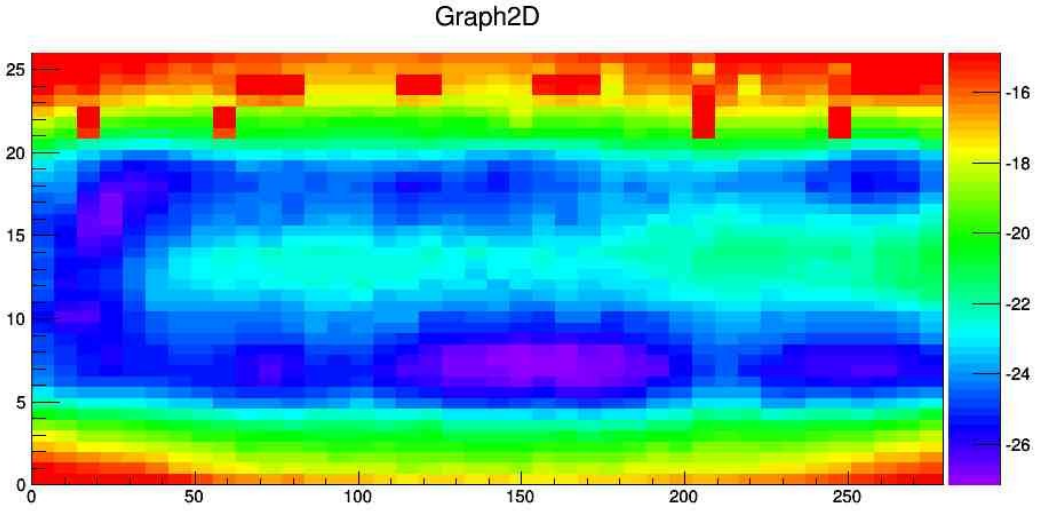
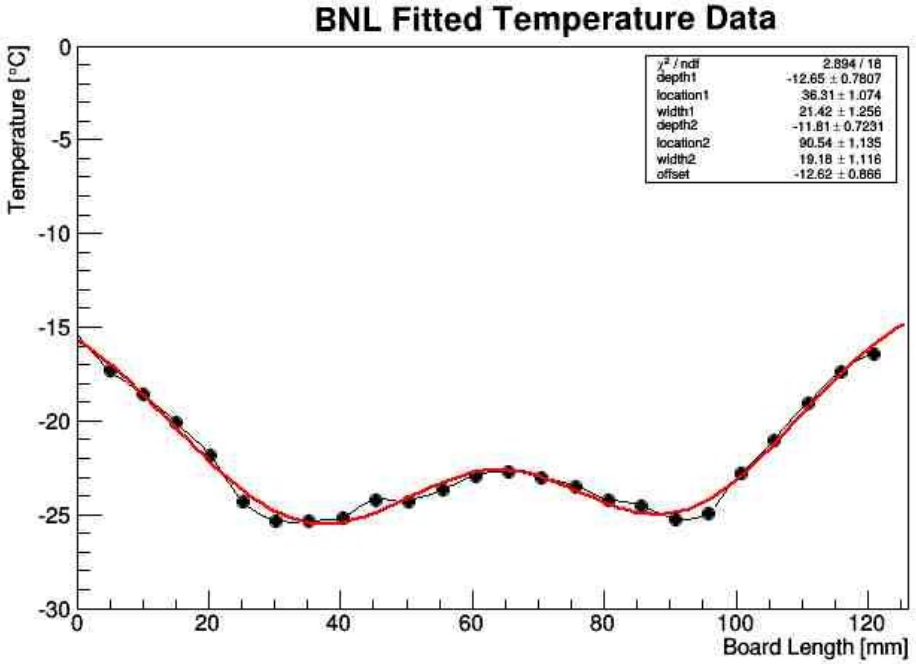
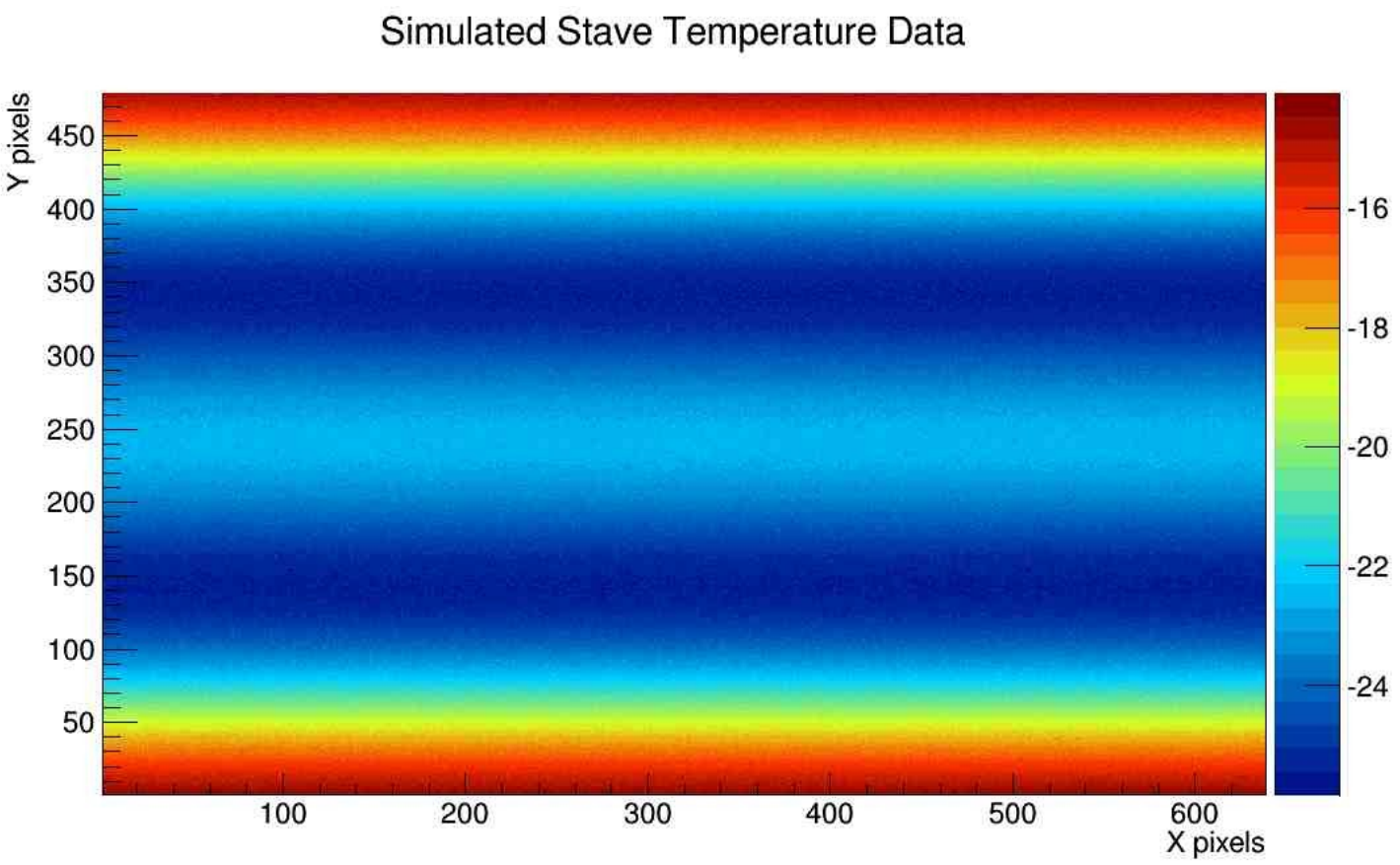
Simulating Stave Data





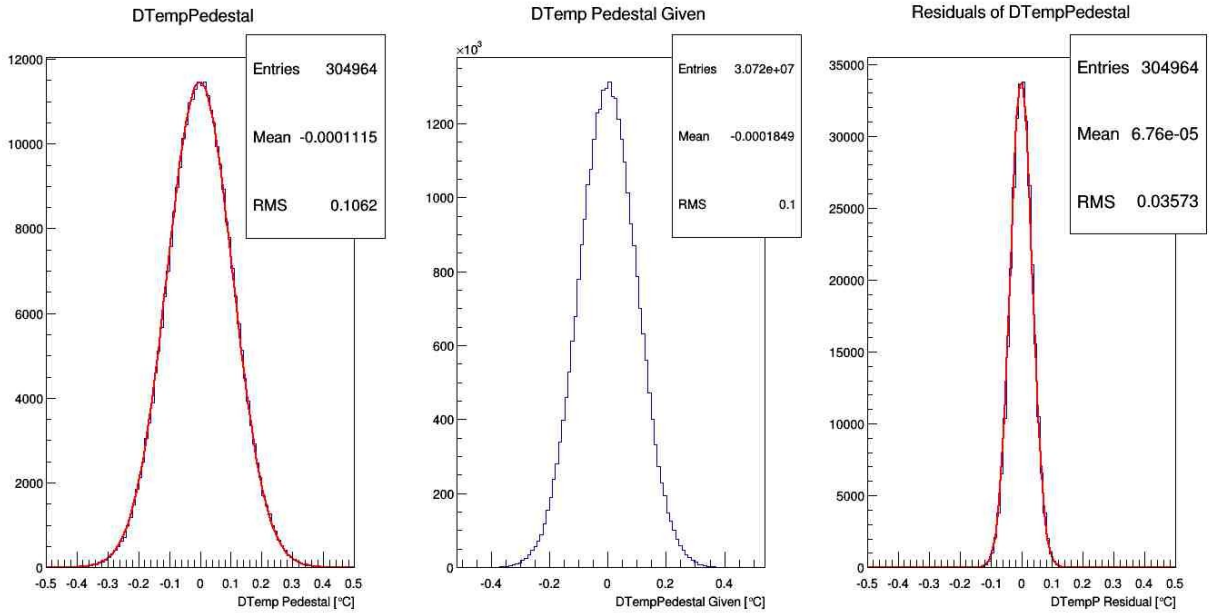
- Using data from the BNL stave temperature experiment, the temperature of the stave was measured at discrete points along the stave in both the x and y directions to see how well defects could be spotted in the stave.
- Using data from a region of the stave that did not have any defects, the temperature as a function of length in the y-direction of the board was measured and averaged over the points in the x-direction. The data was then fit with two Gaussian peaks to create an approximate Y temperature gradient.

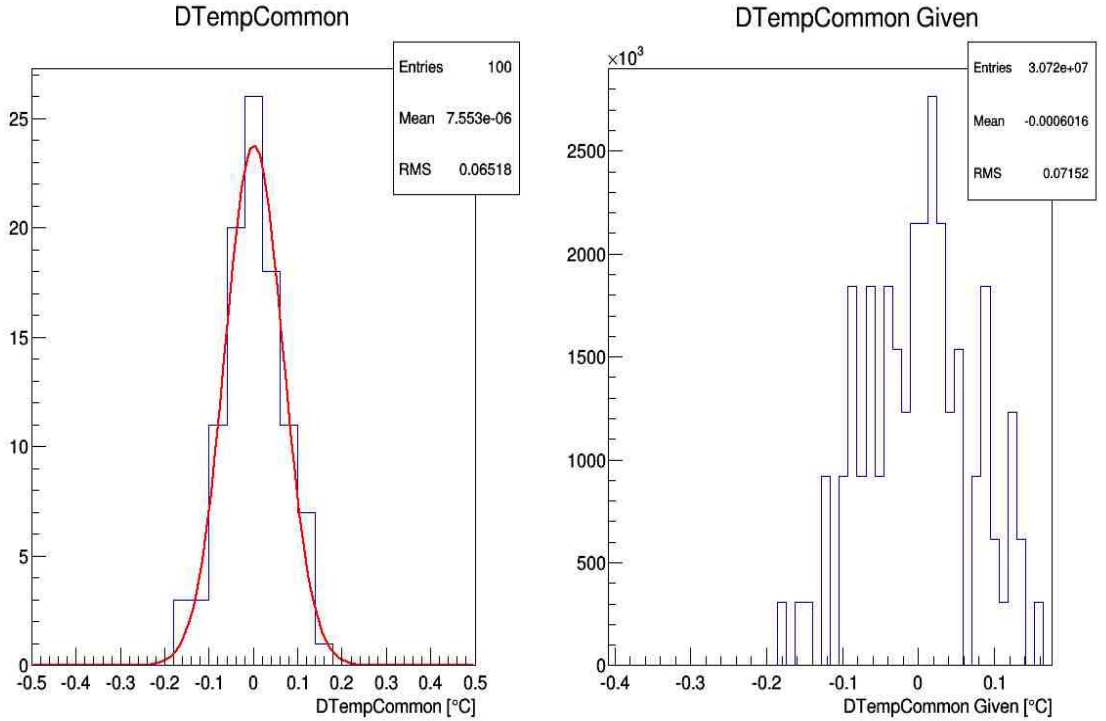
Simulating Stave Data



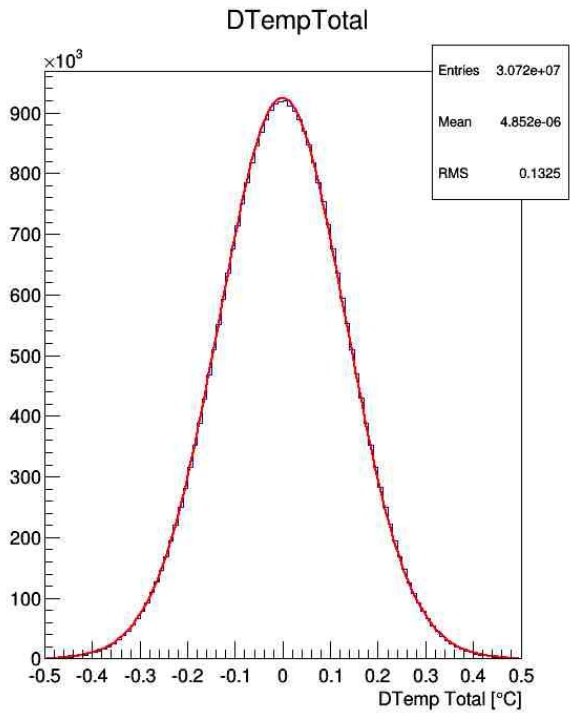
- The gradient was then propagated along the x-axis creating a simulated set of “real” data.
- The “real” data then had three errors added creating what you see at the left.
  - ΔTPedestal:The change in temperature due to the pedestal is a random Gaussian error added to each pixel.
  - ΔTCommon:The change in temperature due to the common mode is a random Gaussian error added to each frame of the data.
  - ΔTNoise:The change in temperature due to statistical noise is a random Gaussian error added to every pixel.

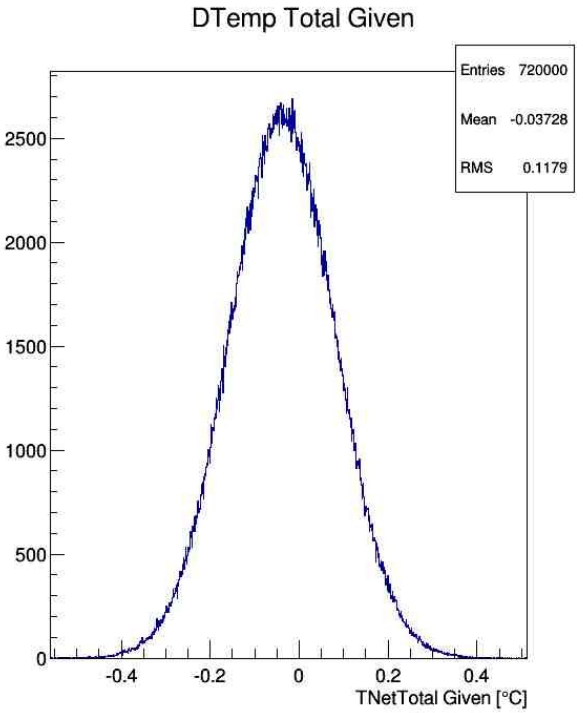
Getting back Input Data





- A simulated set of data was created with 100/500 frames to compare with given values
- **ΔTPedestal**:
  Given σ = 0.1
  Calc. σ = 0.106/0.106
  Resid. σ = 0.036/0.035
- **ΔTCommon**:
  Given σ = 0.08
  Calc σ = 0.065/0.076
- **ΔTNoise**:
  Given σ = 0.05
  Calc σ = 0.047/0.045
- **ΔTTotal**:
  Exp σ = 0.137
  Calc σ = 0.133/0.138


DTempTotal
×10^3
Entries 3.072e+07
Mean 4.852e-06
RMS 0.1325
900
800
700
600
500
400
300
200
100
0
-0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5
DTemp Total [°C]


DTemp Total Given
Entries 720000
Mean -0.03728
RMS 0.1179
2500
2000
1500
1000
500
0
-0.4 -0.2 0 0.2 0.4
TNetTotal Given [°C]