

Data Analysis

ATLAS ITk

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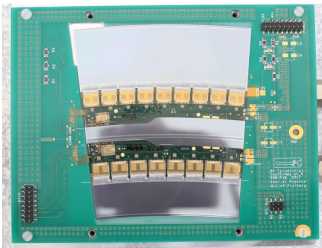
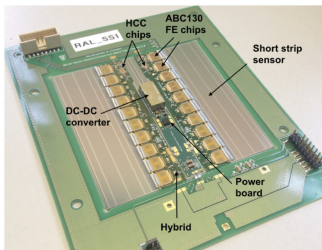
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Acis Readout Threshold

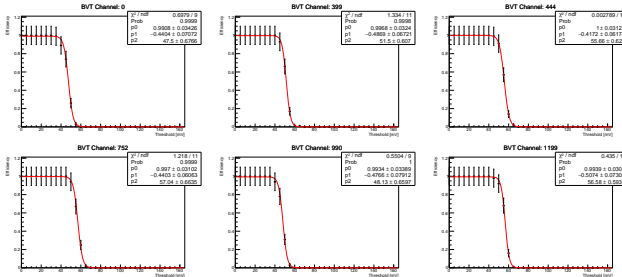
Future/Current Work: Higgs Decay Plots



ATLAS ITk Endcap Module Terminology



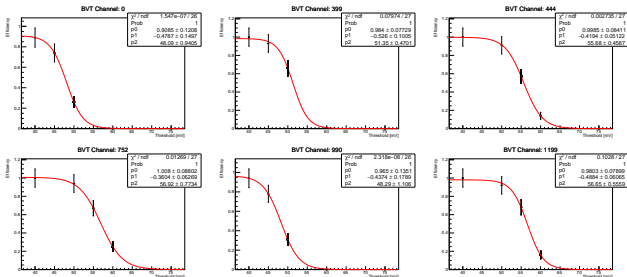
Threshold S-Curve



- ▶ vt50 marks the threshold cutoff of the channel
- ▶ 100 counts sent to each channel

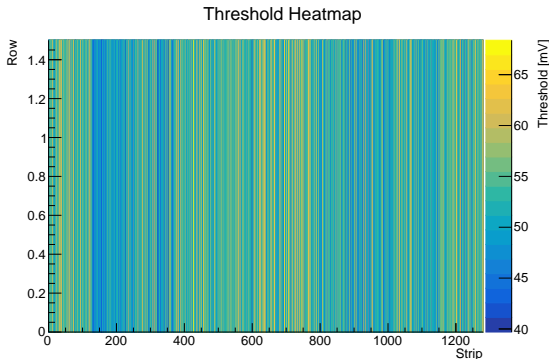


Bisection Method



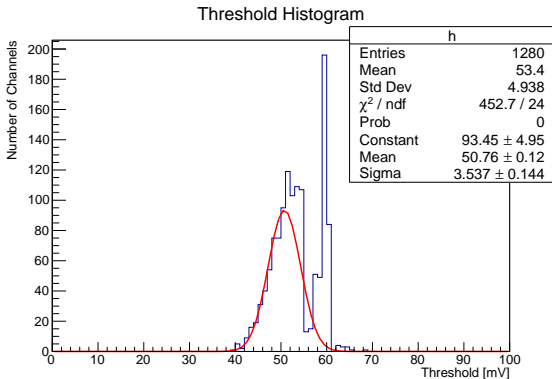
- ▶ Extrapolates the minimum points required
- ▶ Leaves the fit unchanged

Threshold Heatmap



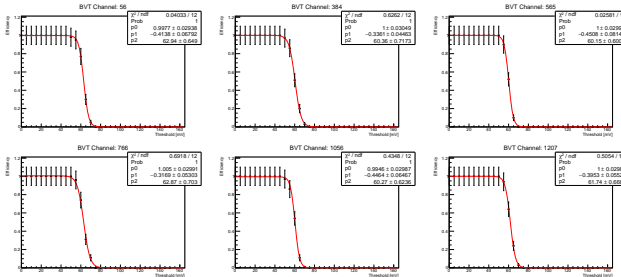
- ▶ Each colored line represents a channel/strip
- ▶ No clear pattern in distribution

Threshold Histogram



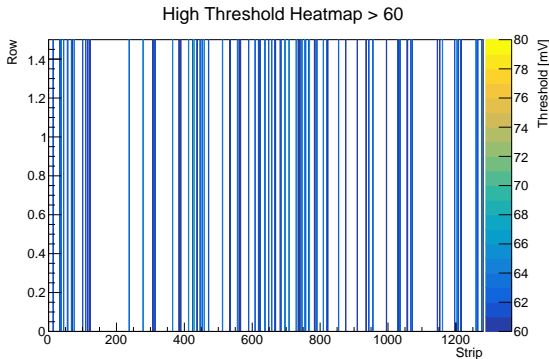
- ▶ Expected to see a Gaussian like distribution
- ▶ Threshold should not be greater than 60 mV

High Threshold S-Curves



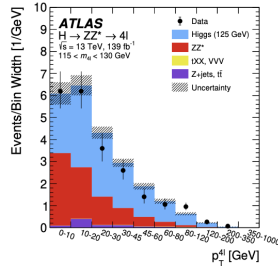
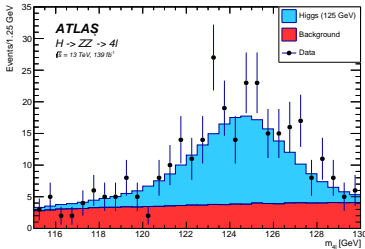
- ▶ All channels shown have a threshold greater than 60 mV
- ▶ No error in the fit of the S-Curves

High Threshold Heatmap



- ▶ No high threshold source coming from the edges/center of the silicon
- ▶ Quite concerning that they're so many faulty channels ~8%

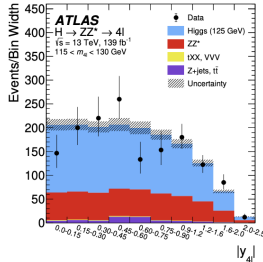
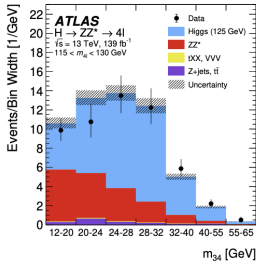
Higgs to 4 Leptons Decay Plots



- ▶ Invariant mass plot
- ▶ Transverse Momentum Plot



Higgs to 4 Leptons Decay Plots



- ▶ Invariant mass of subleading lepton pair
- ▶ Rapidity of the four-lepton system



References

[1] Collaboration, A. (2020, November 10). Measurements of the higgs boson inclusive and differential fiducial cross sections in the 4ℓ decay channel at $\sqrt{s} = 13$ TEV. arXiv.org.
<https://arxiv.org/abs/2004.03969>

