Trying to Understand Unbiased Residuals

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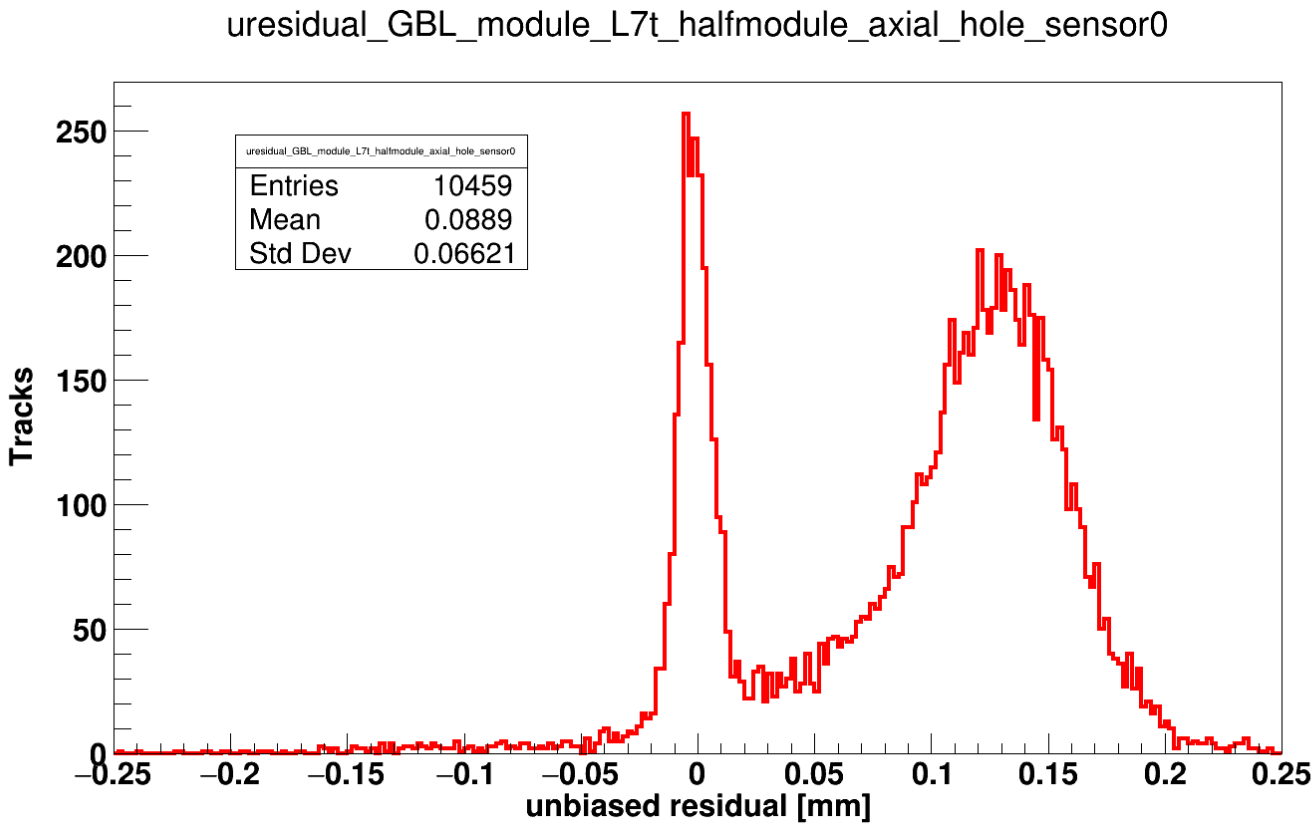
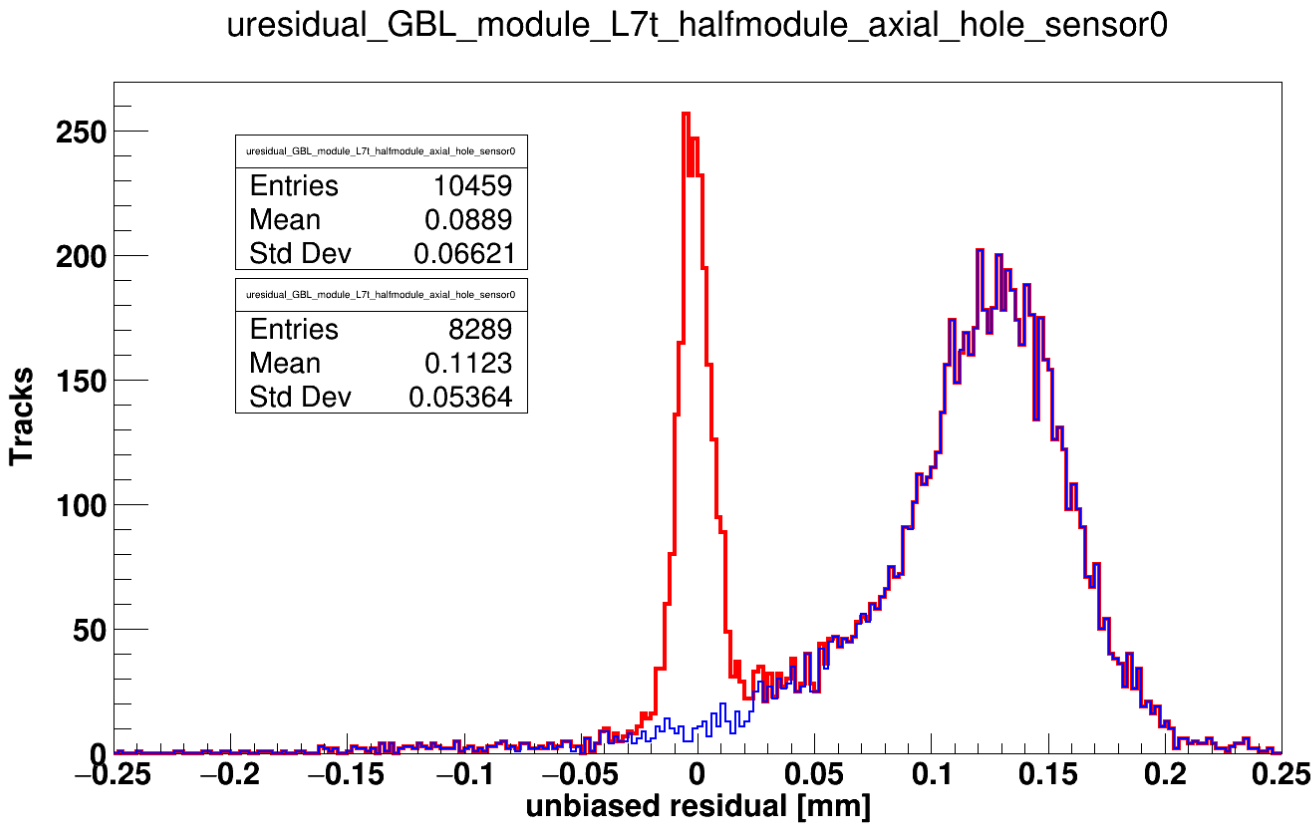
Introduction



This sensor is layer 13

- Last week we had a heated discussion on the source of this peak at zero in one of my intermediate detectors
- This is a single file, requiring at least 13 hits on track

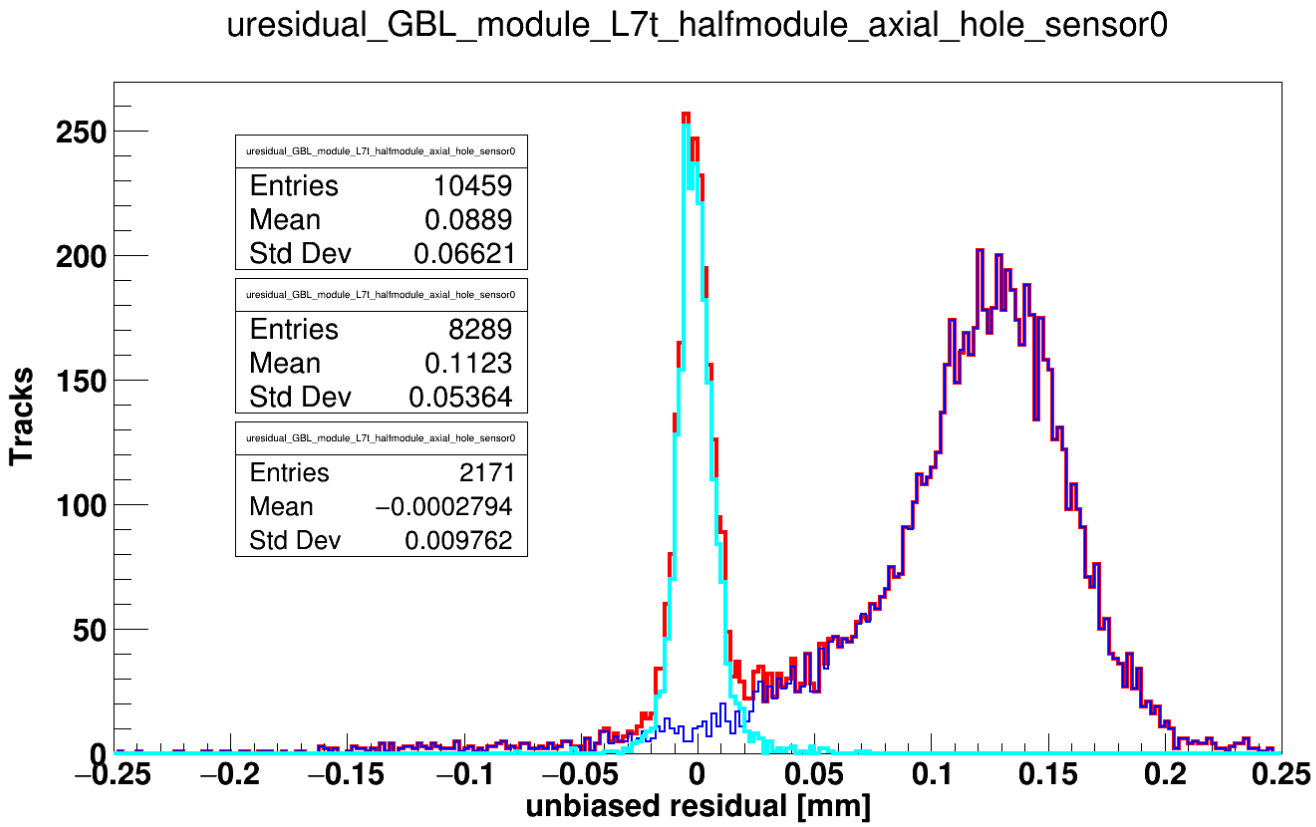
Introduction



This sensor is layer 13

- New blue histo are tracks with at least 13 hits and a hit in both layers 13 and 14
- Peak around zero must be when we are missing hit in 13 or 14

Introduction



This sensor is layer 13

- New light blue line are tracks with at least 13 hits and specifically do not have a hit in layer 14
- No entries in histogram for layer 14

Discussion

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- Also checked when these tracks are specifically missing a layer 13 hit
  - Similar looking thing going on in stereo sensor (layer 14)
  - No entries in layer 13 sensor unbiased residuals
- Doesn’t appear to be a bug in PFs handling of the residuals
  - Hacked out biased residuals to double check this
  - No residual entries in layers specifically without a hit on the track
- Don’t get me wrong, I am not saying this isn’t a bug
  - Also not saying I am 100% convinced it is
- I think this means one of two things
  - We don’t understand something critical about GBL model
  - Calculation of unbiased residuals is incorrect only in this special case of having a single hit in a module (axial-stereo pair)