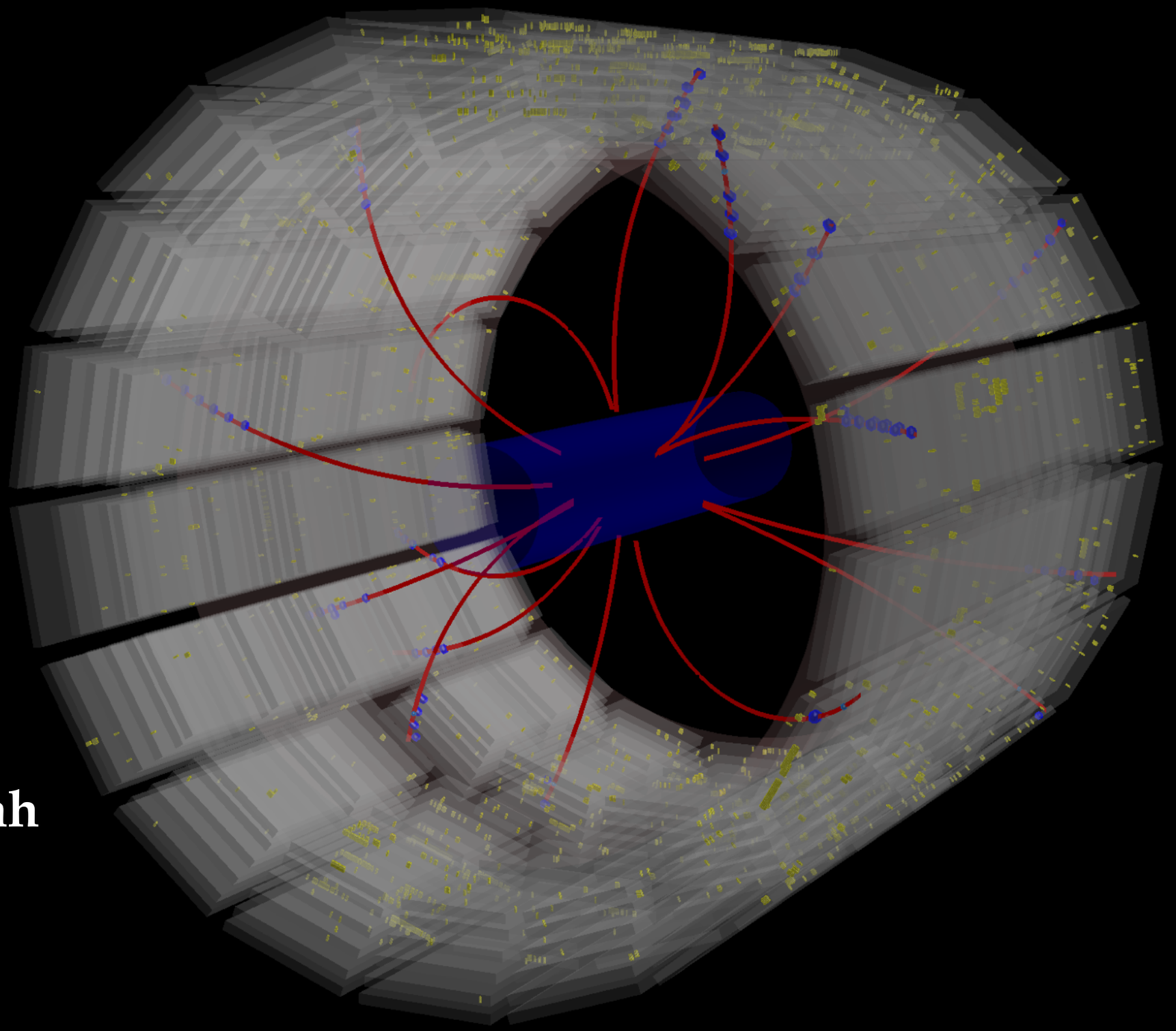
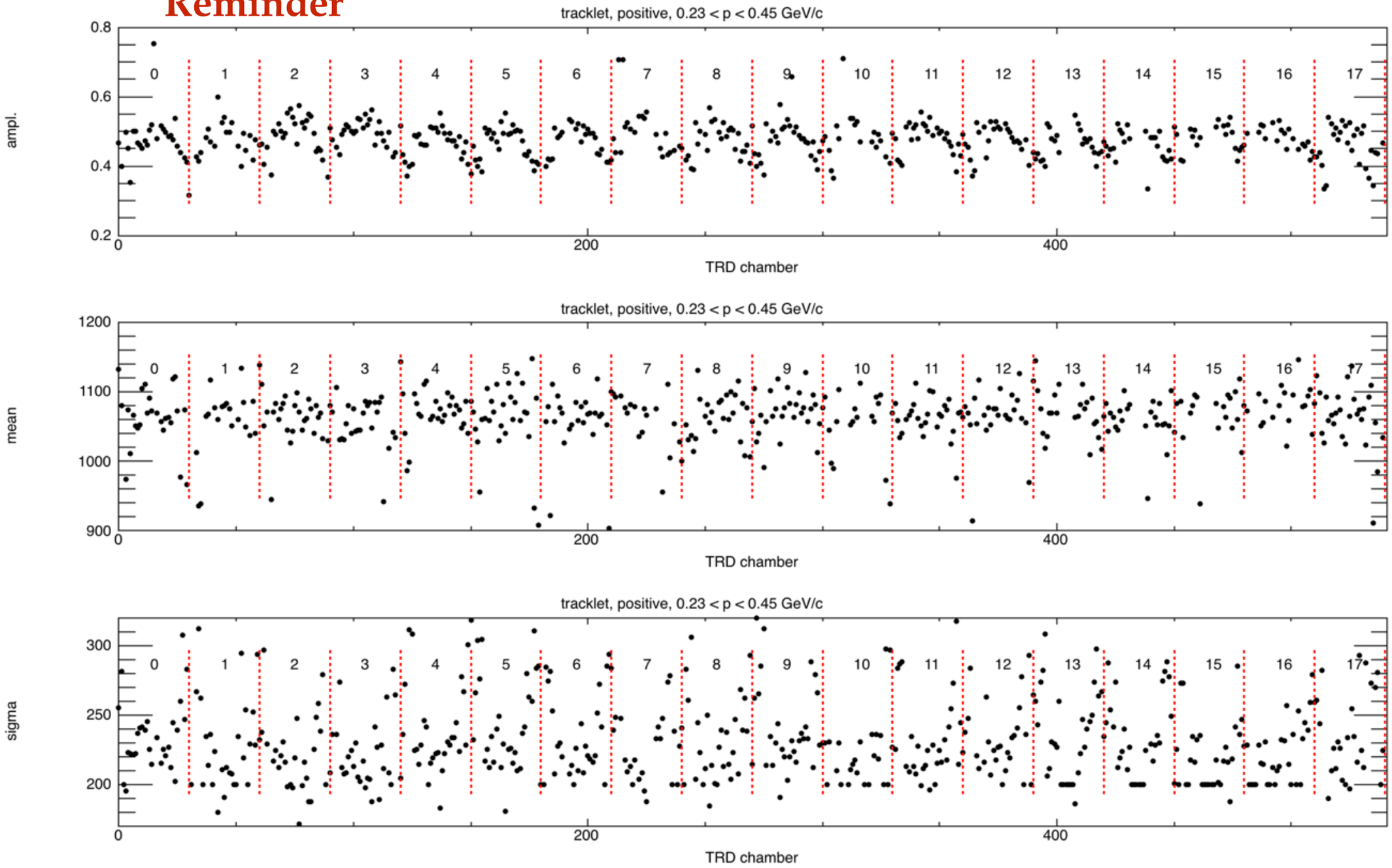
Progress Report:
- TRD Calibration



Alexander Schmah
University of Heidelberg
24.05.2018

Landau Fit Param.: 0.23<p<0.45 GeV/c

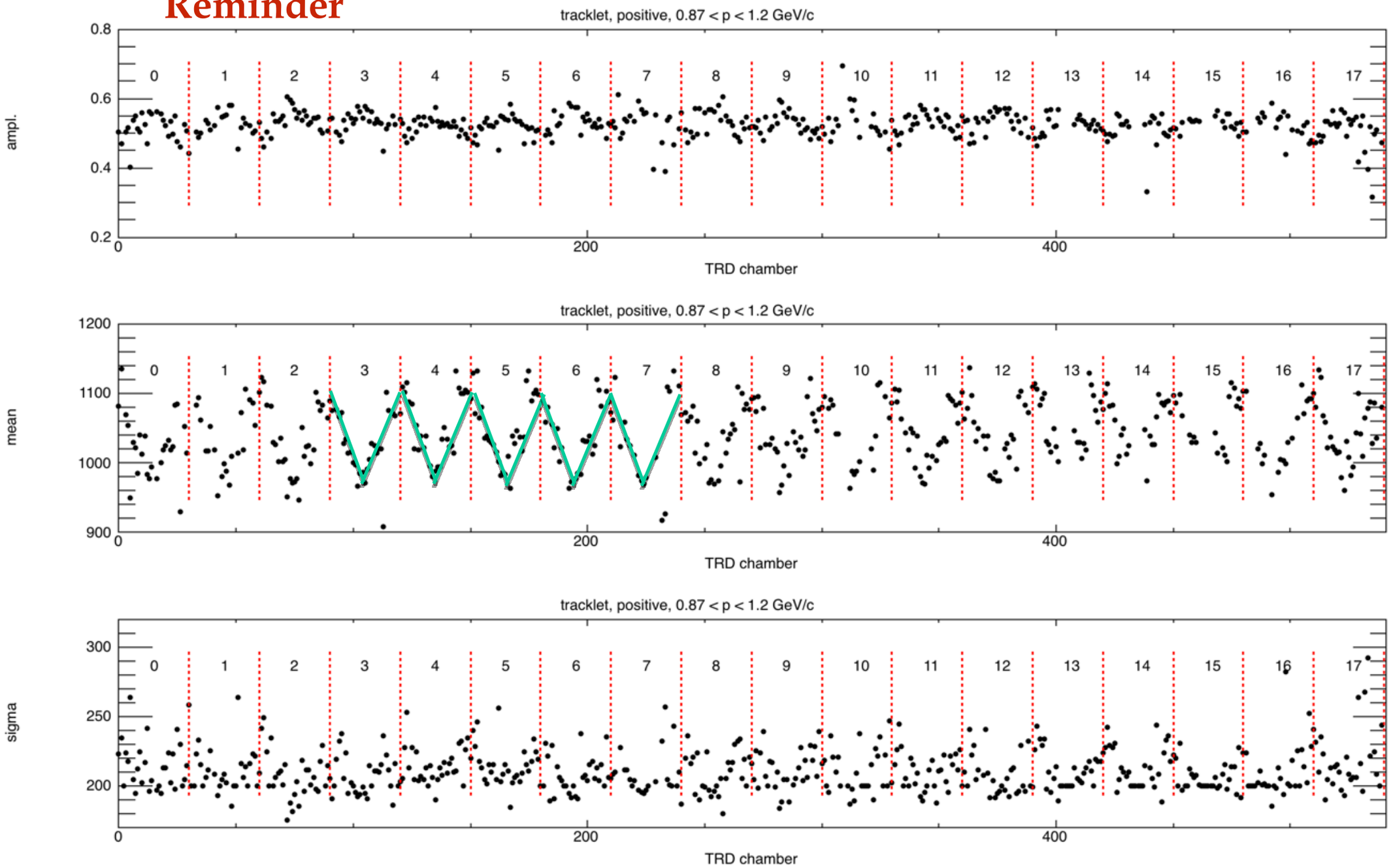
Reminder



- At low momenta mean distribution seems to be flat.

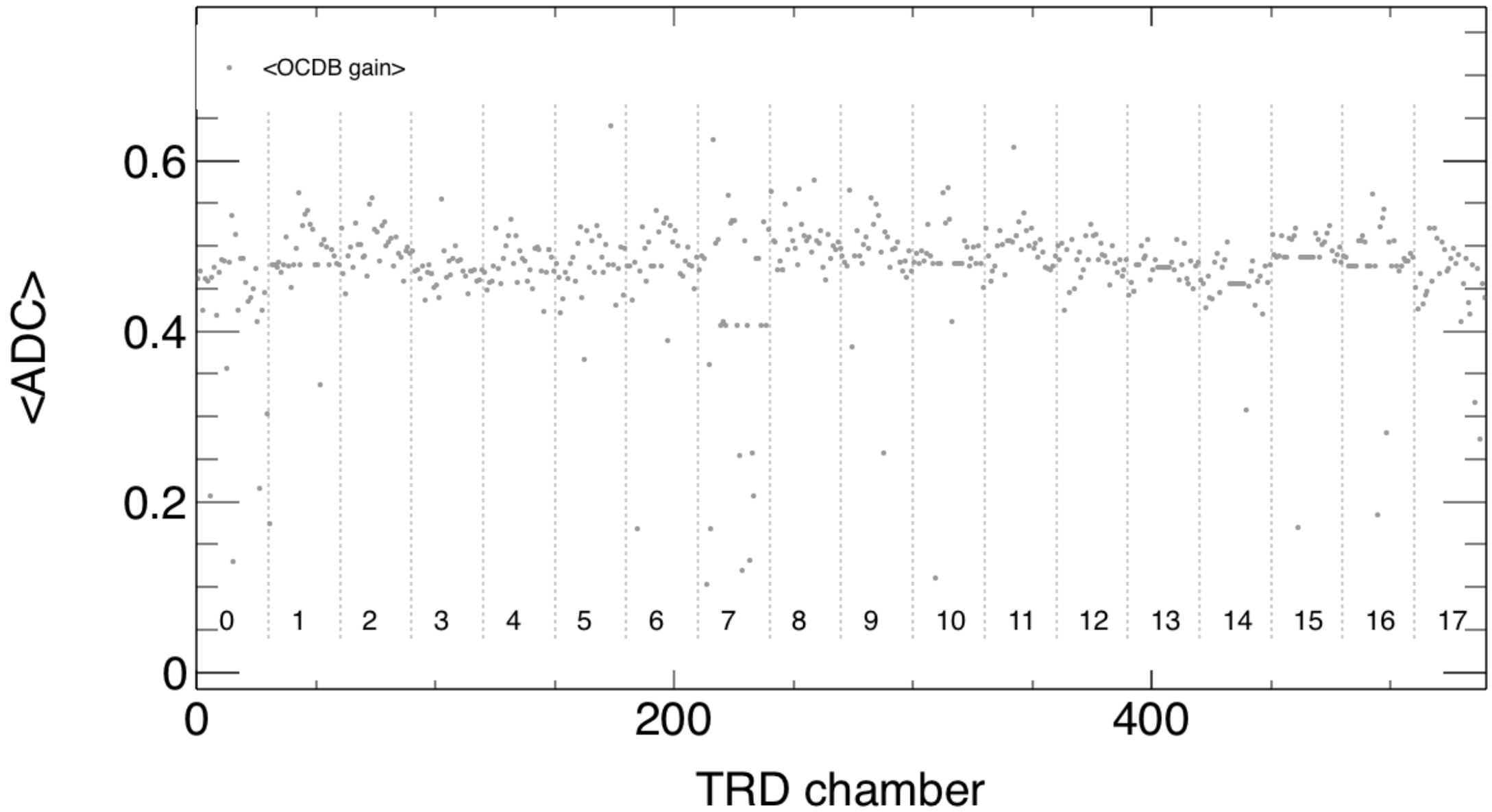
Landau Fit Param.: 0.87<p<1.2 GeV/c

Reminder



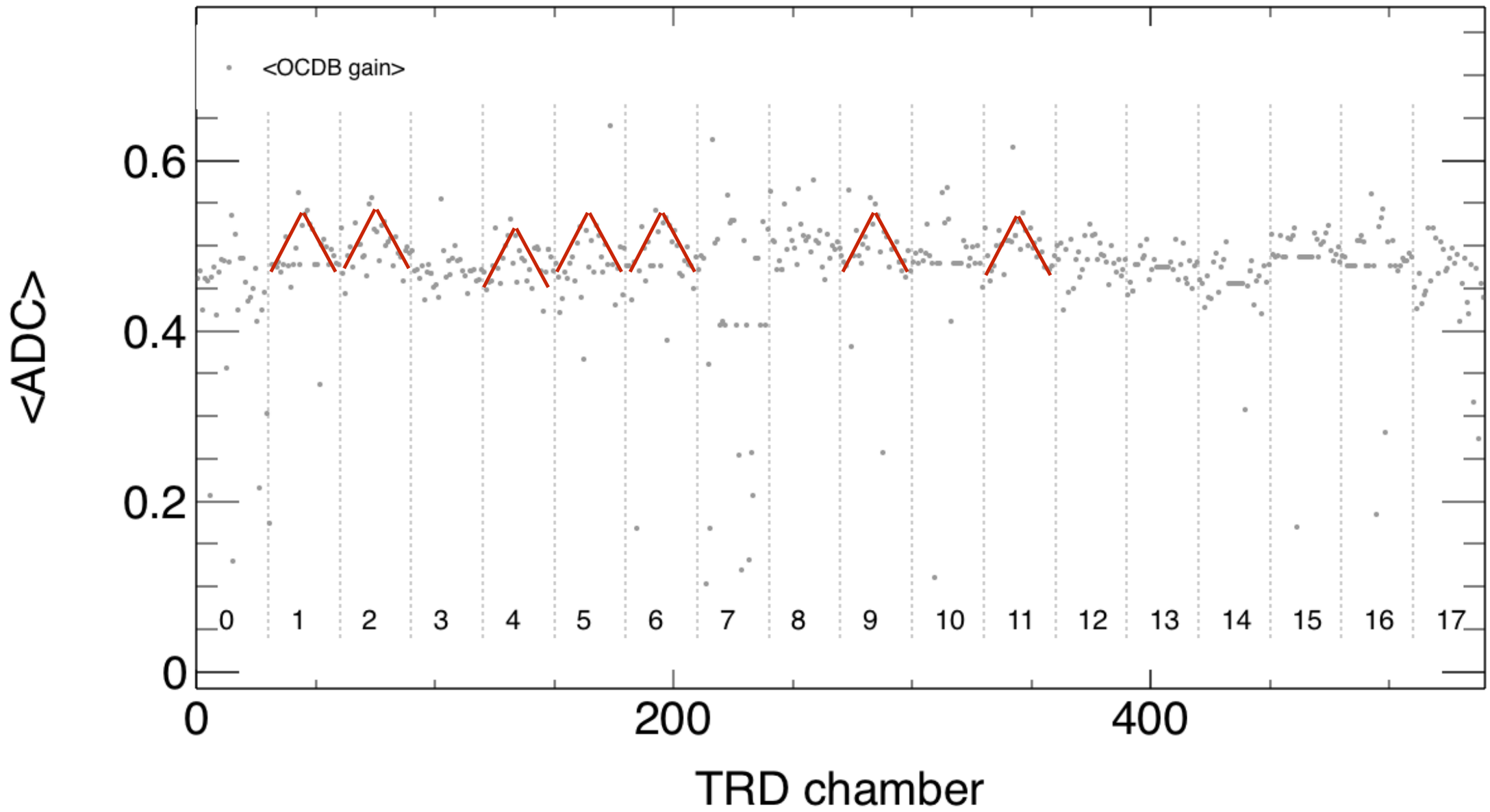
- At higher momenta a clear dip for mid-rapidity is observed.

TRD Chamber Gain from OCDB



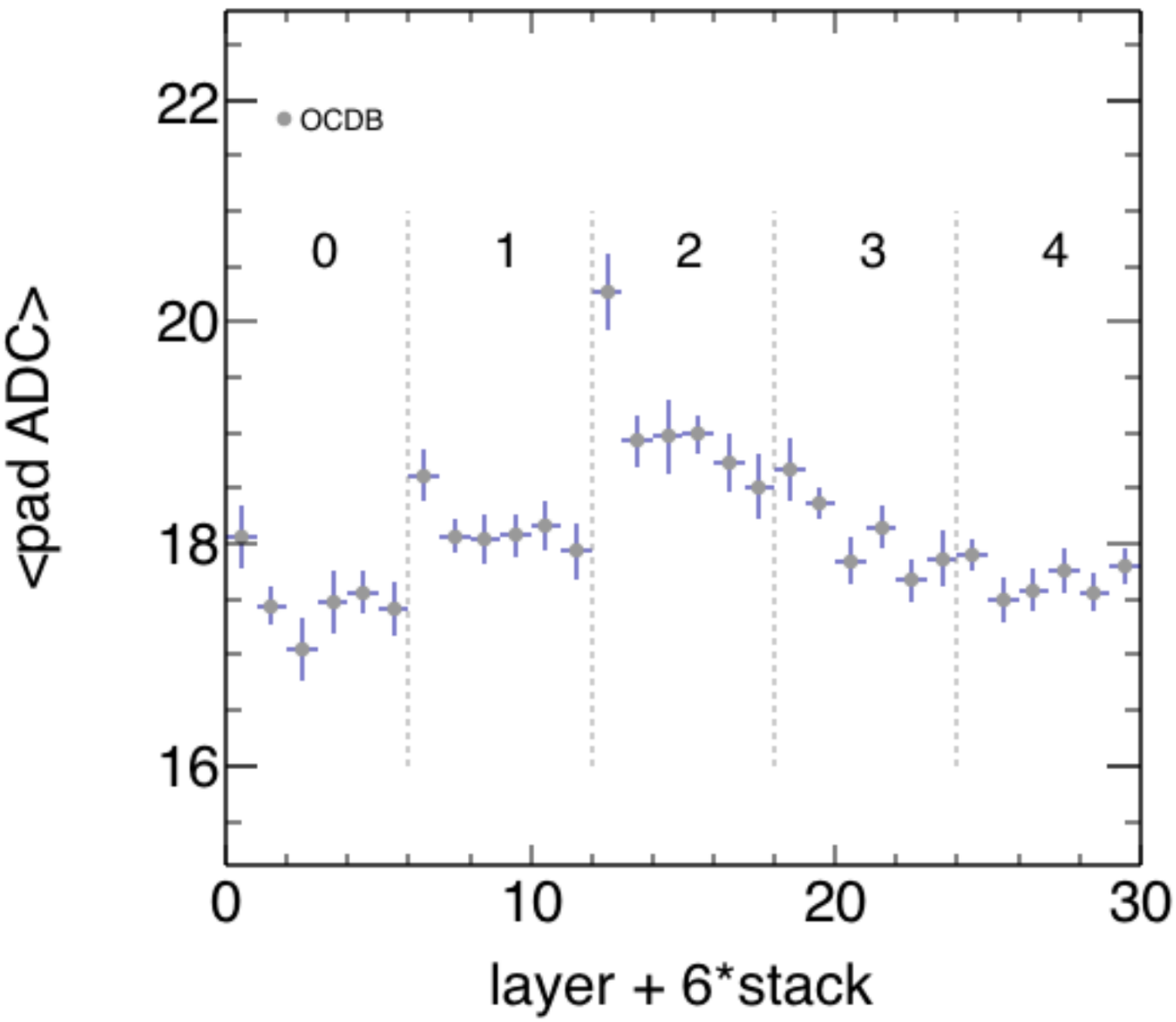
- Average chamber gain determined by all tracks → mainly low momenta tracks are used.

TRD Chamber Gain from OCDB



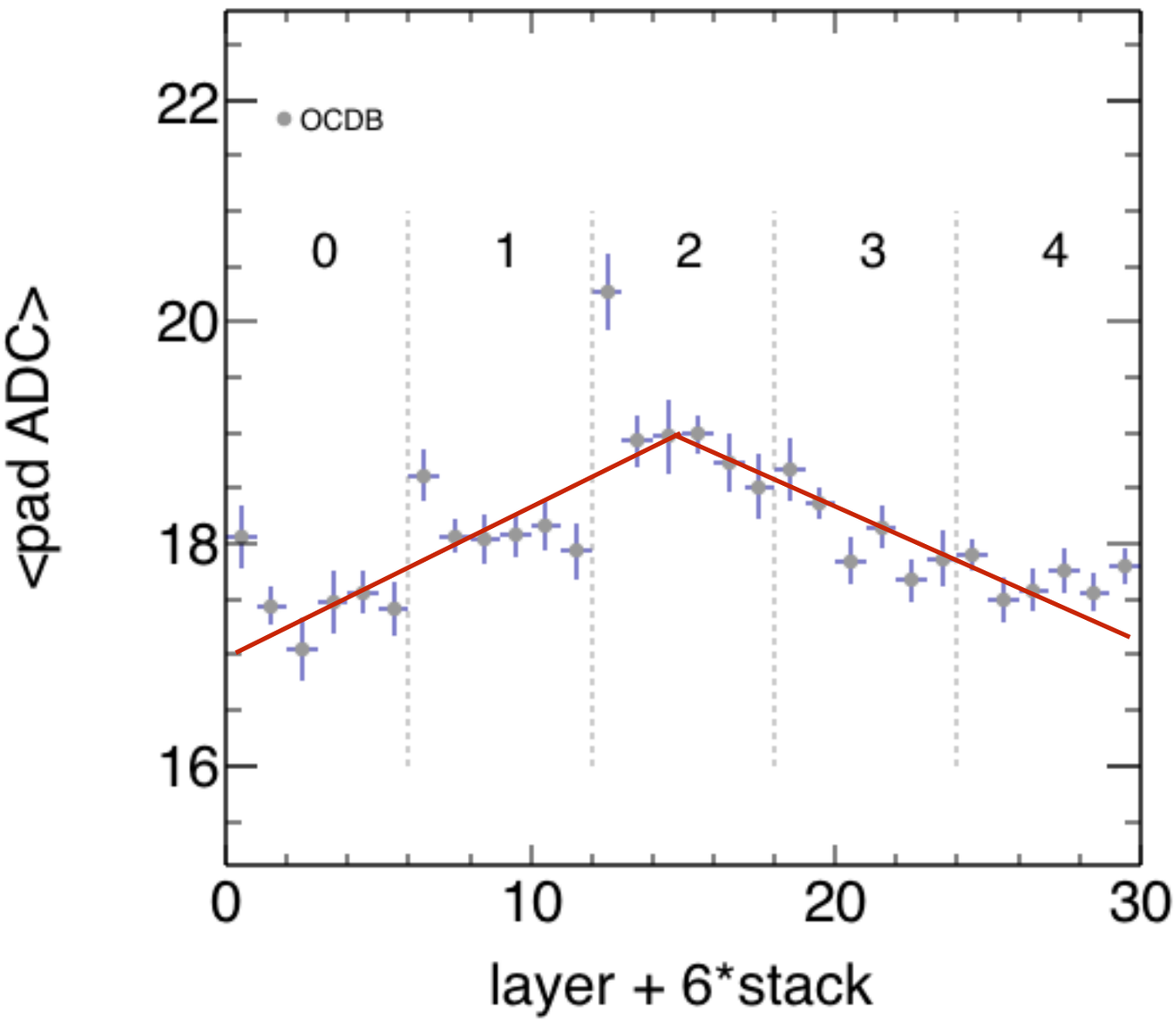
- Large fluctuations but a systematic effect is visible.

TRD Chamber Gain from OCDB



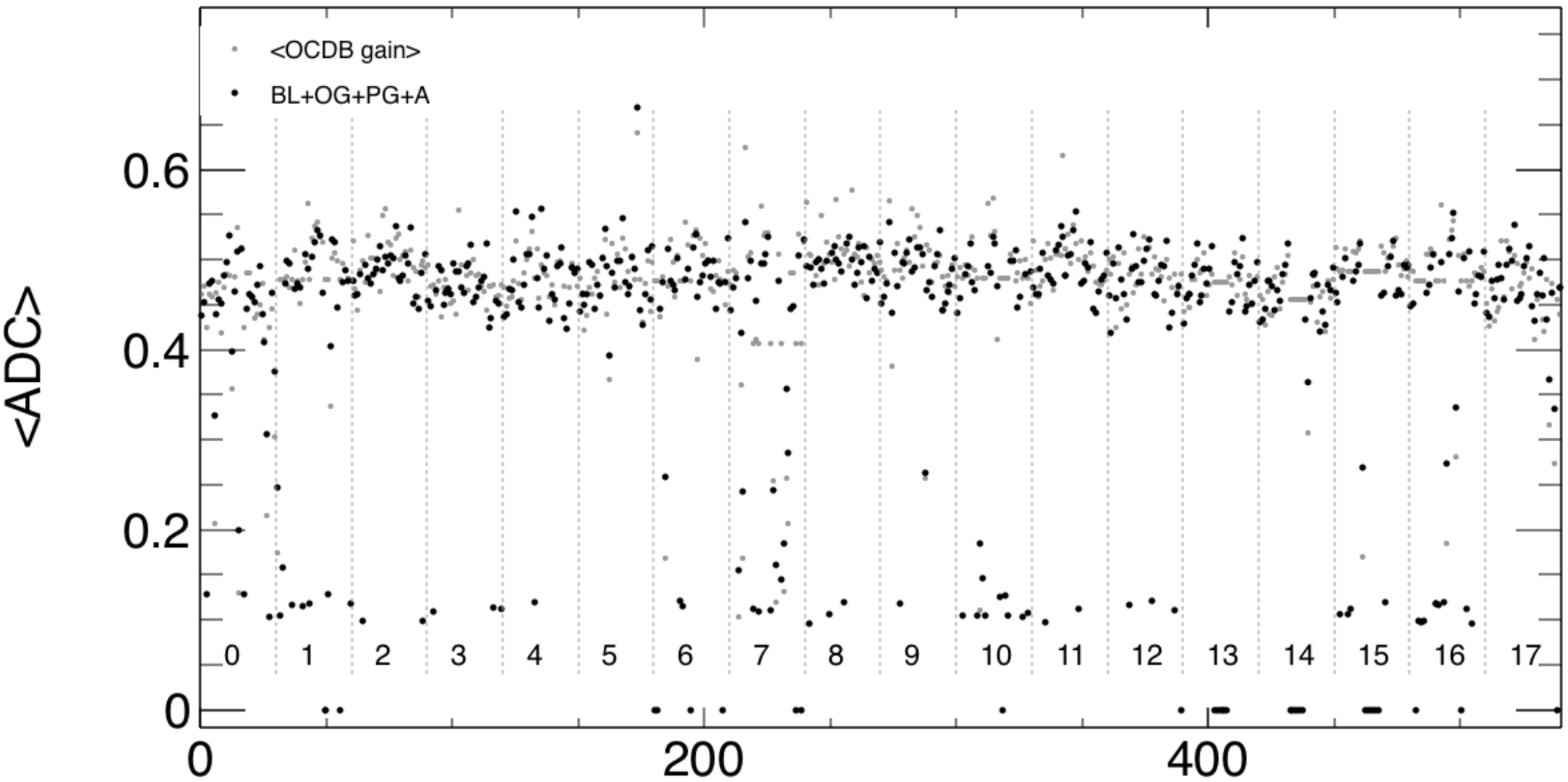
- Clear polar angle dependence.

TRD Chamber Gain



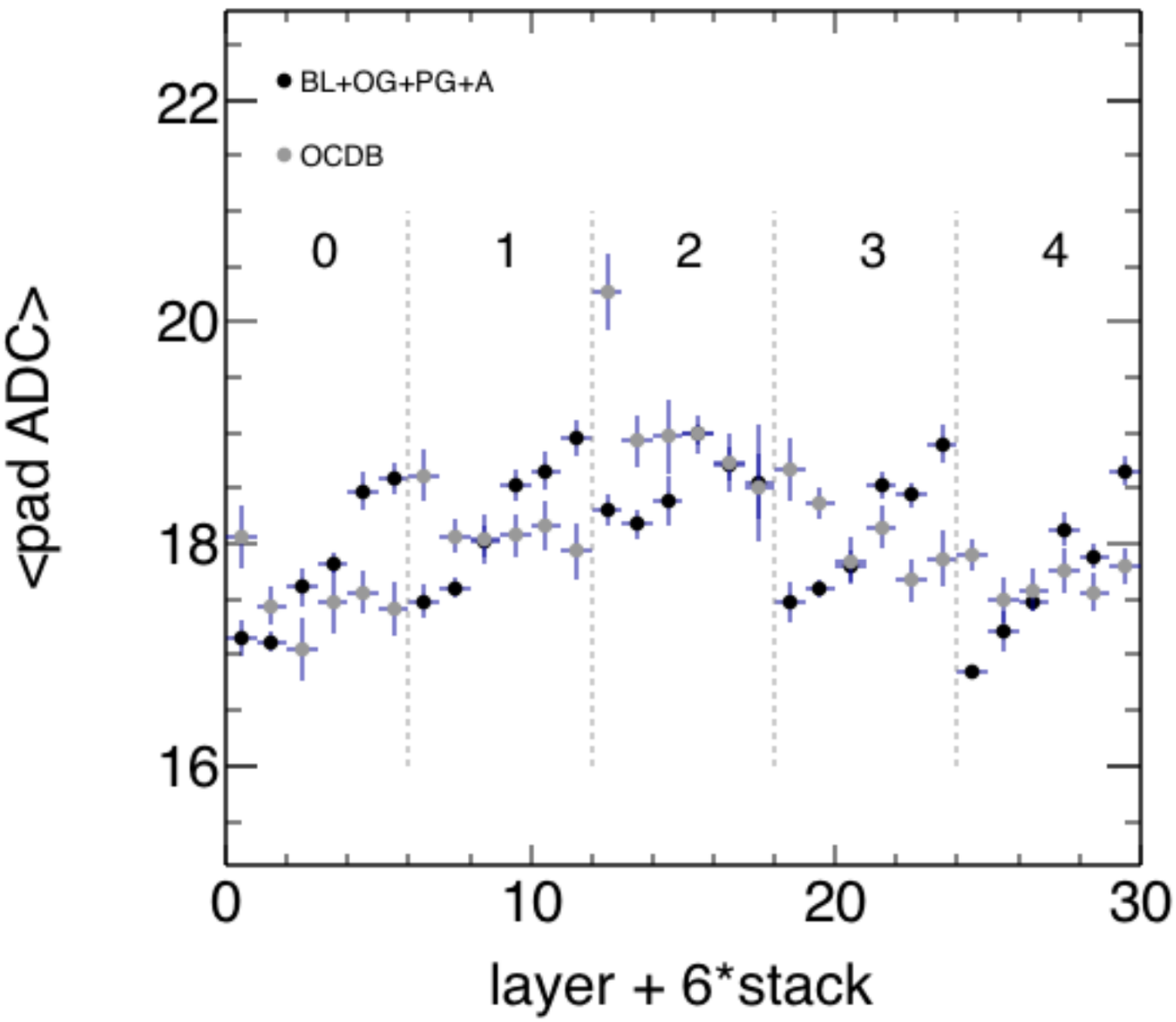
- Clear polar angle dependence.

TRD Chamber Gain



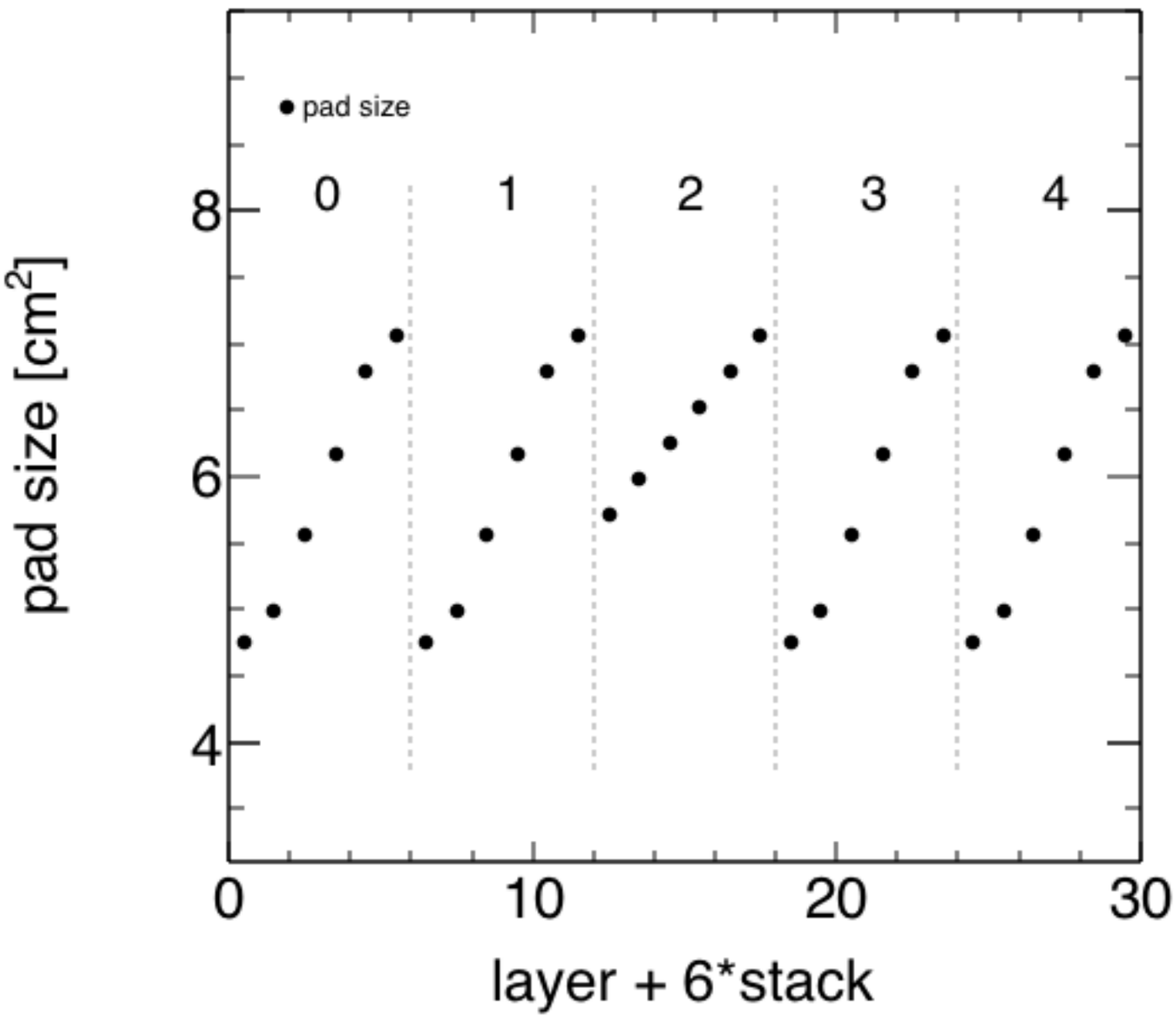
- The black points are from averaging over mean pad gains, corrected for **B**ase**L**ine, **O**nline**G**ain, **P**ad**G**ain and impact **A**ngle.
- Similar structures observed.

TRD Chamber Gain



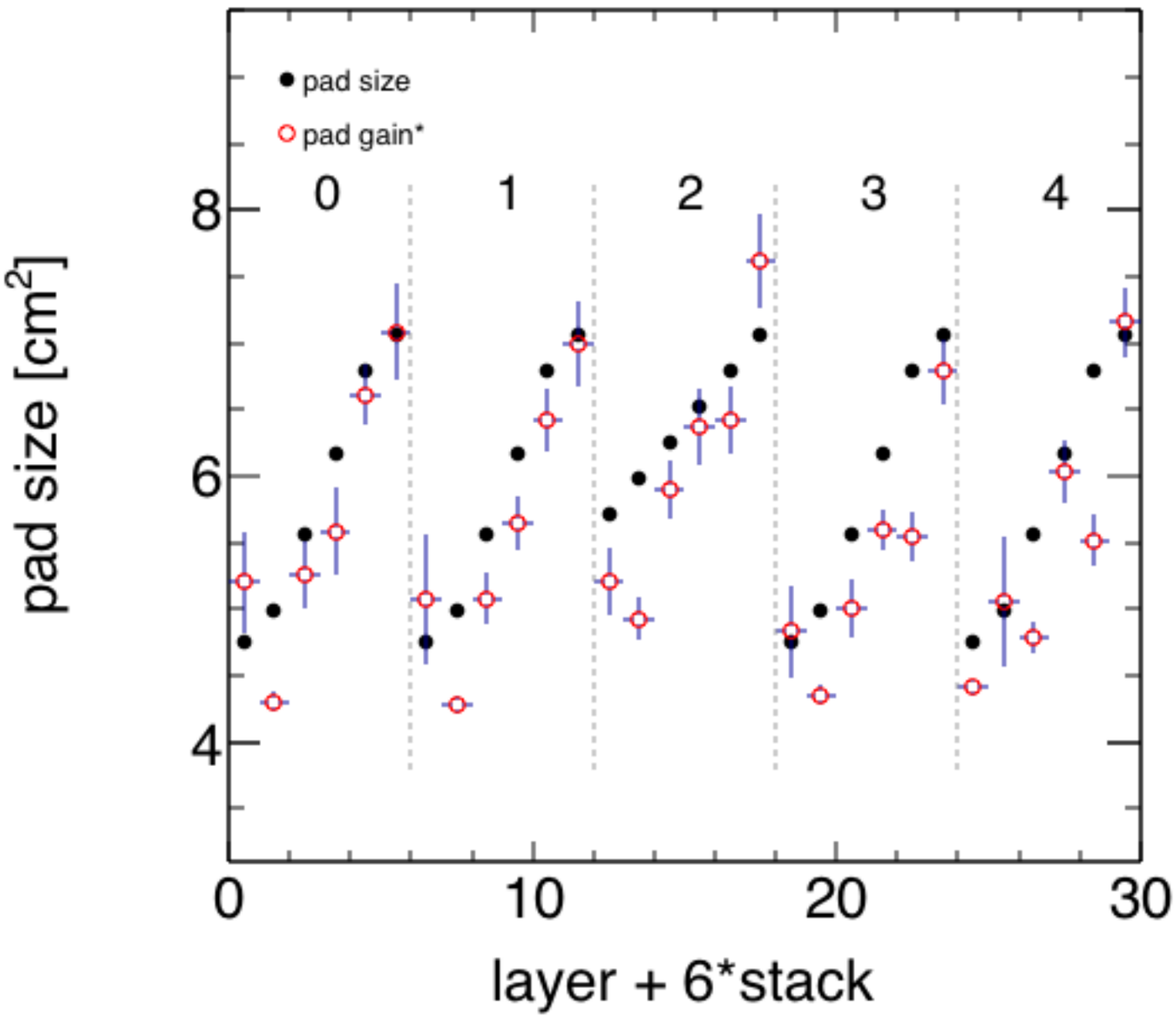
- In addition a second structure is observed within each stack.

TRD Pad Sizes



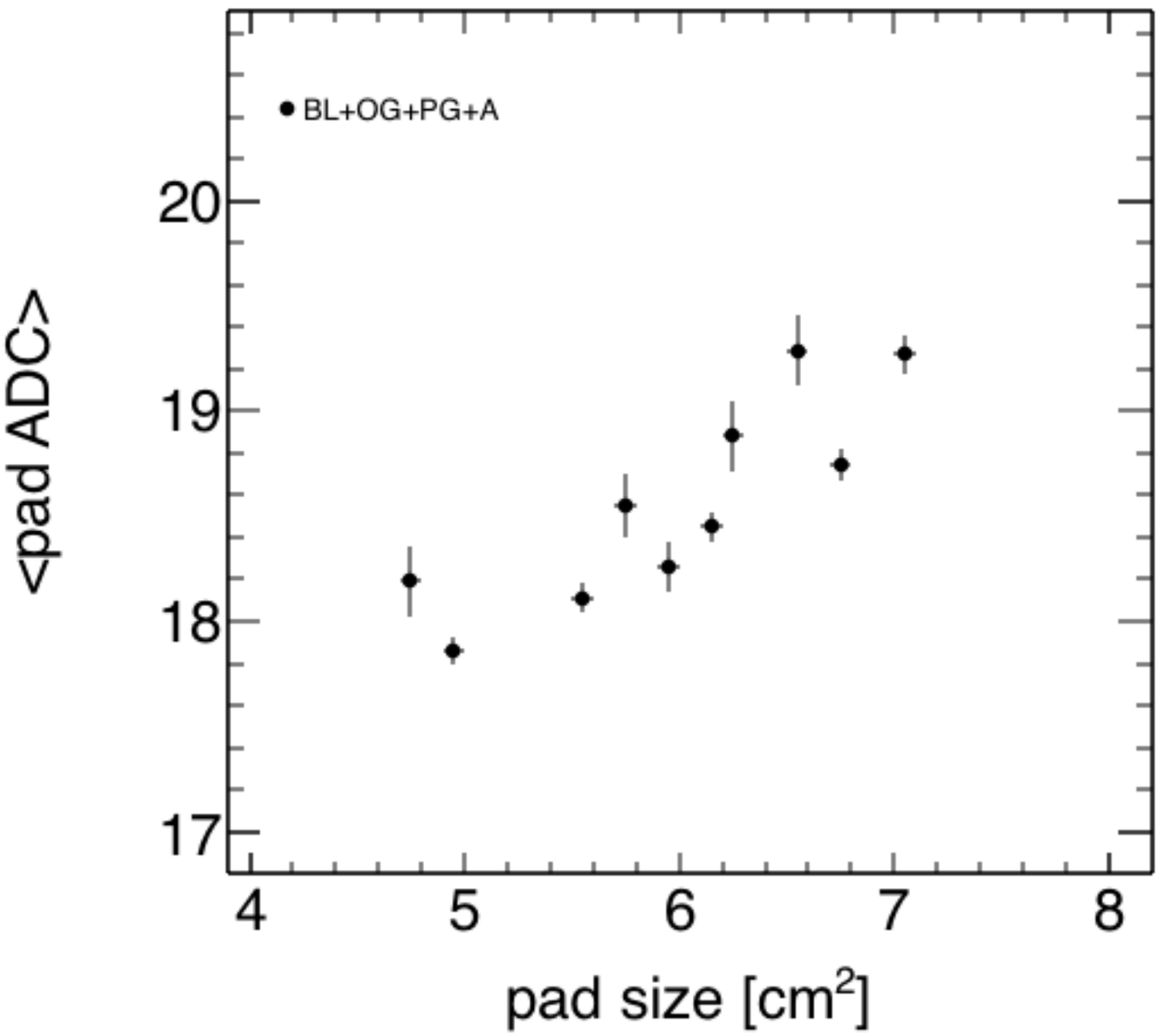
- Pad sizes change from layer to layer and from stack to stack.

TRD Chamber Sizes and Gain



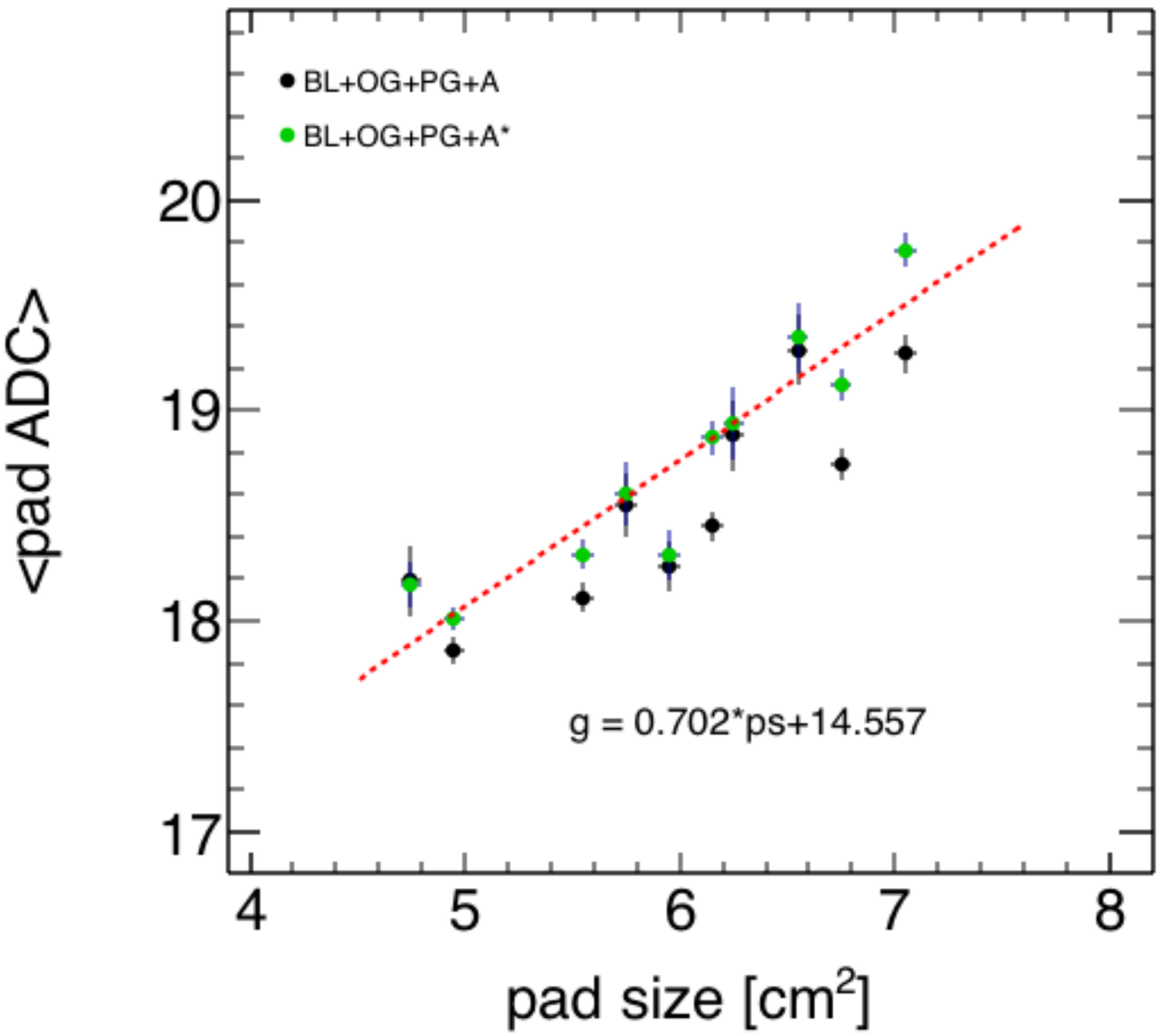
- Gain per pad is following the pad size.
  → larger pads collect more charge but threshold effects are important too (neighboring pads)!

Gain vs. Pad Size



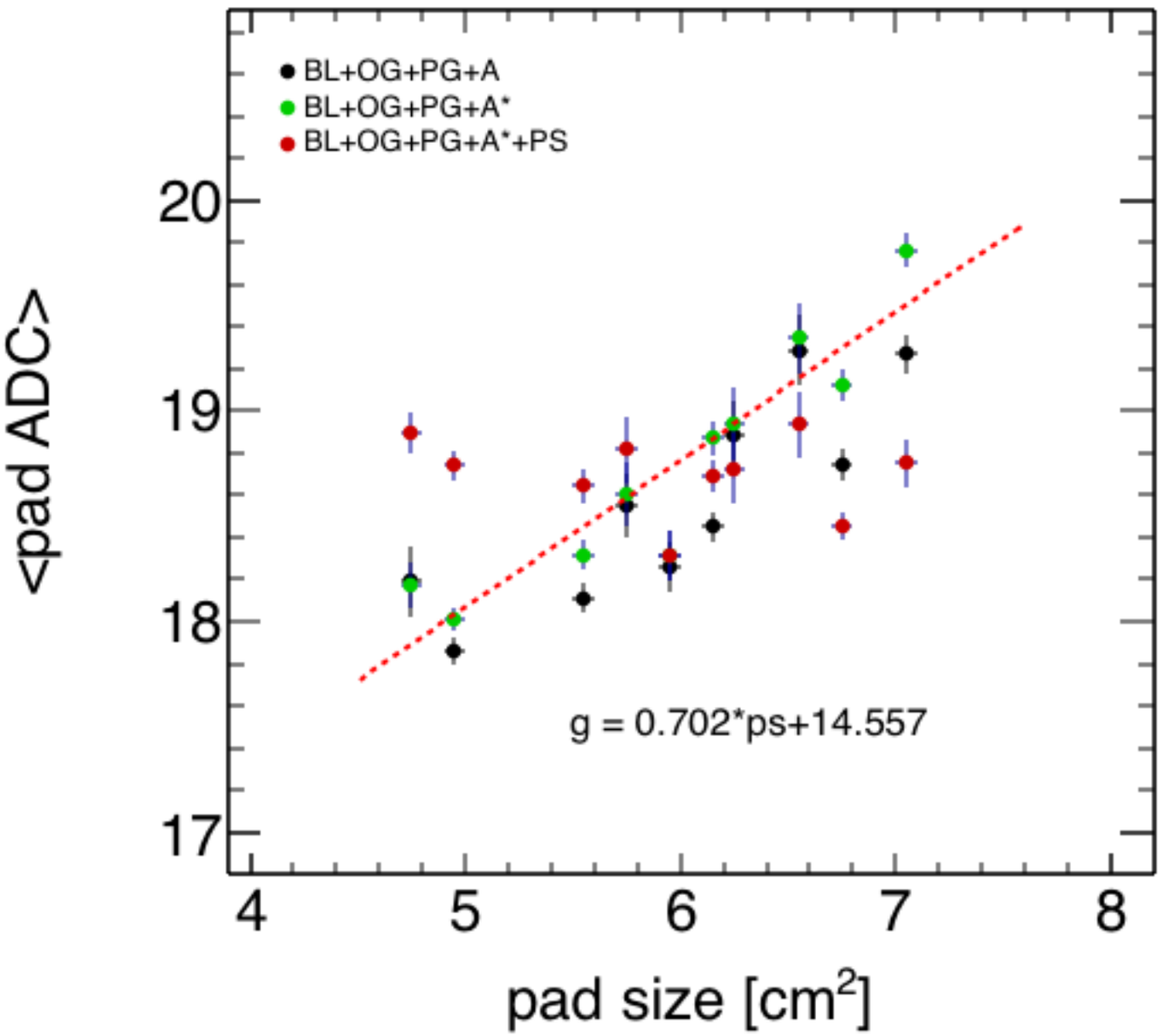
- Linear correlation, fluctuations are coming from chamber to chamber gain fluctuations which are not corrected yet.

Gain vs. Pad Size



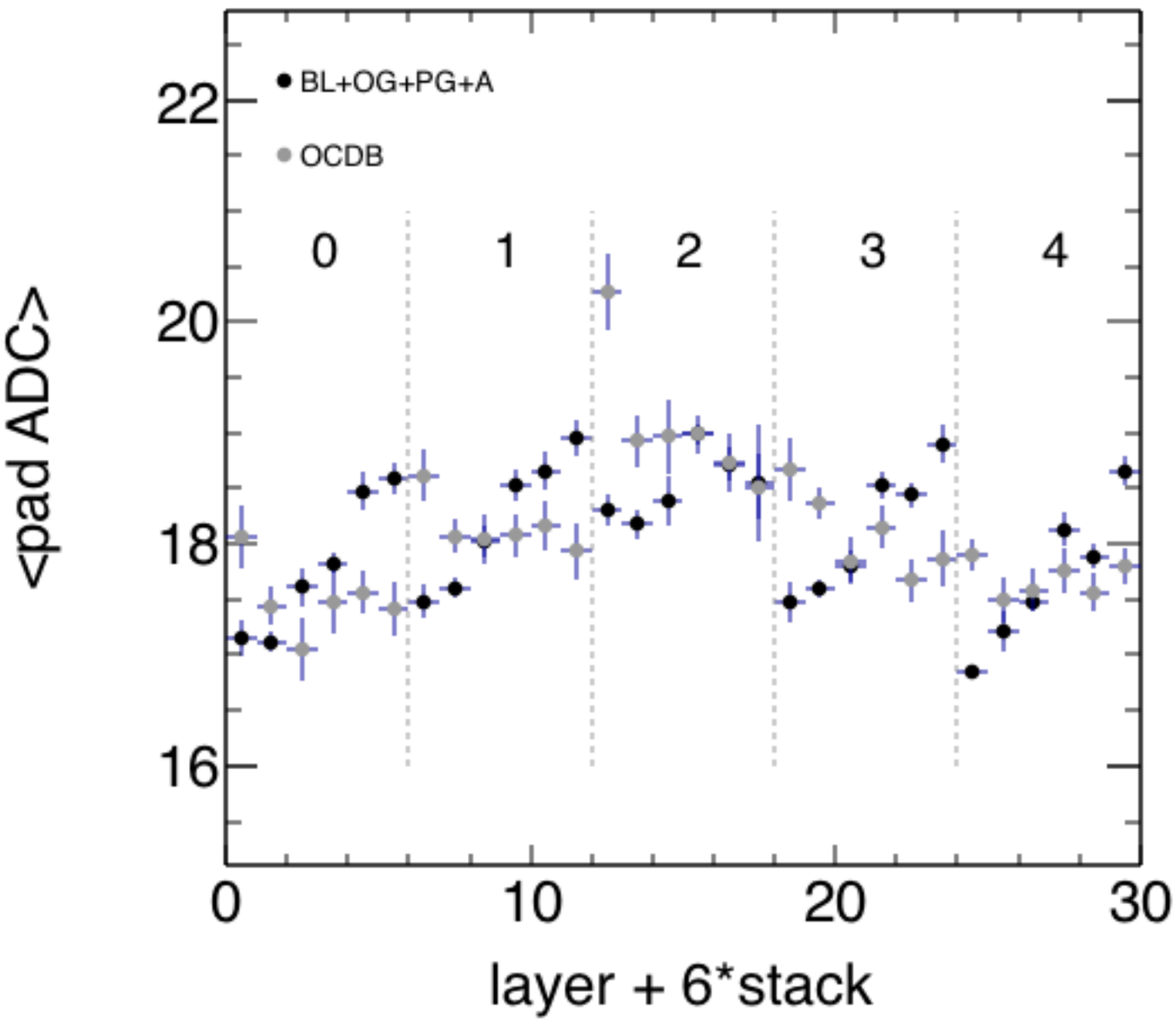
- Linear fit applied for correction.

Gain vs. Pad Size



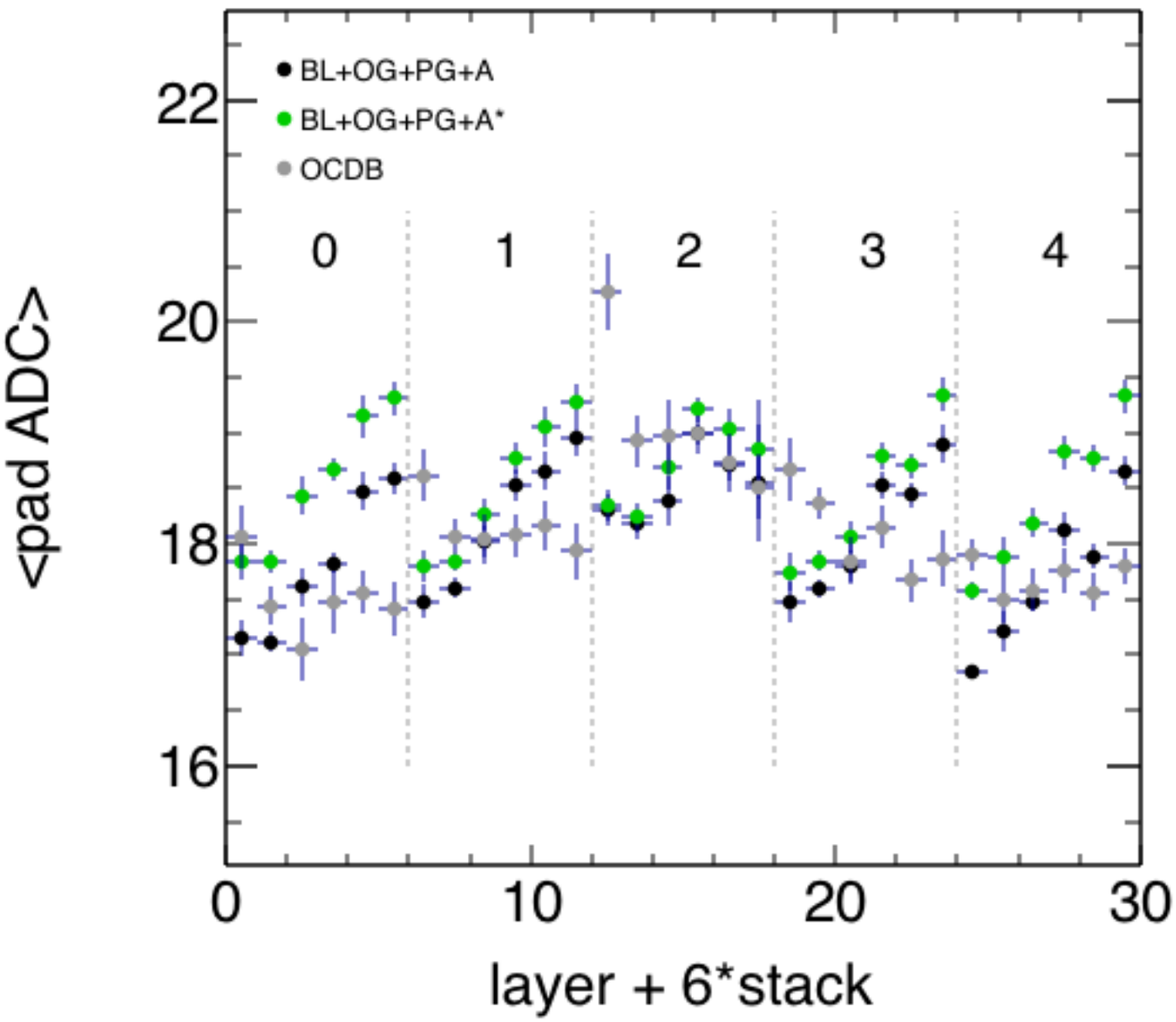
- Red points show the <pad ADC> after all corrections are applied.

TRD Chamber Gain



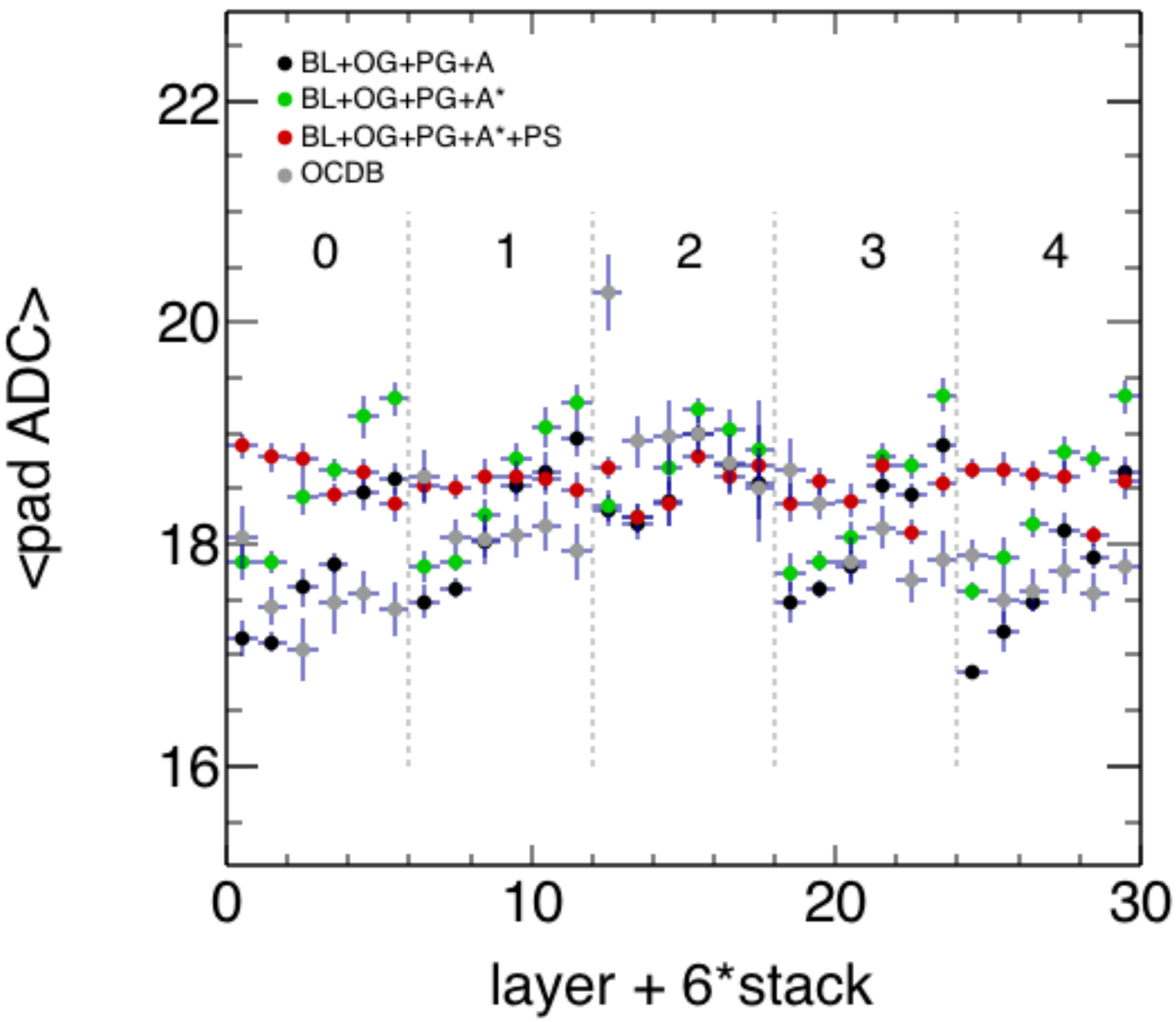
- Reminder: Polar angle dependence and pad size dependence.

TRD Chamber Gain



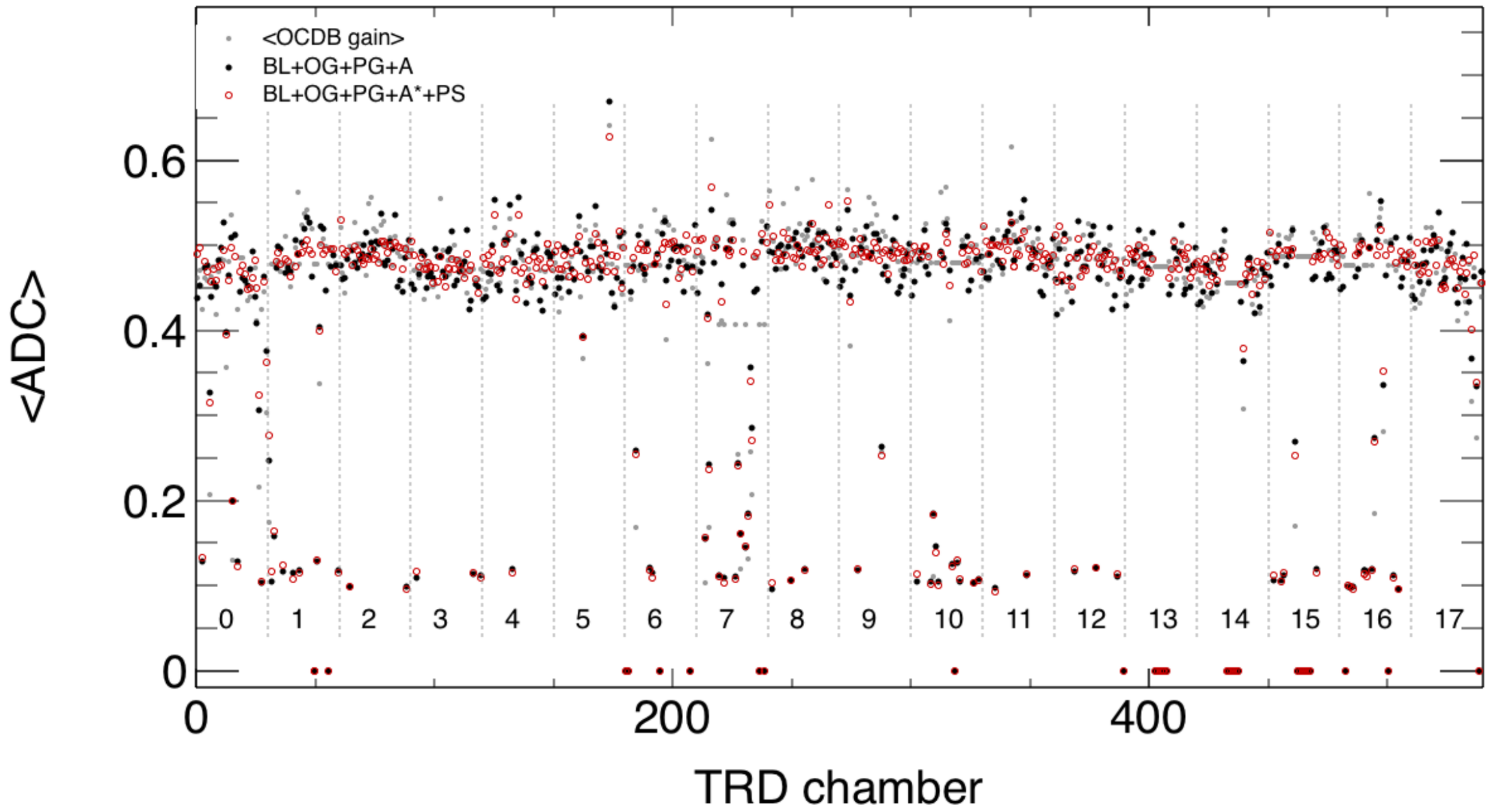
- Green: Polar angle dependence corrected.

TRD Chamber Gain



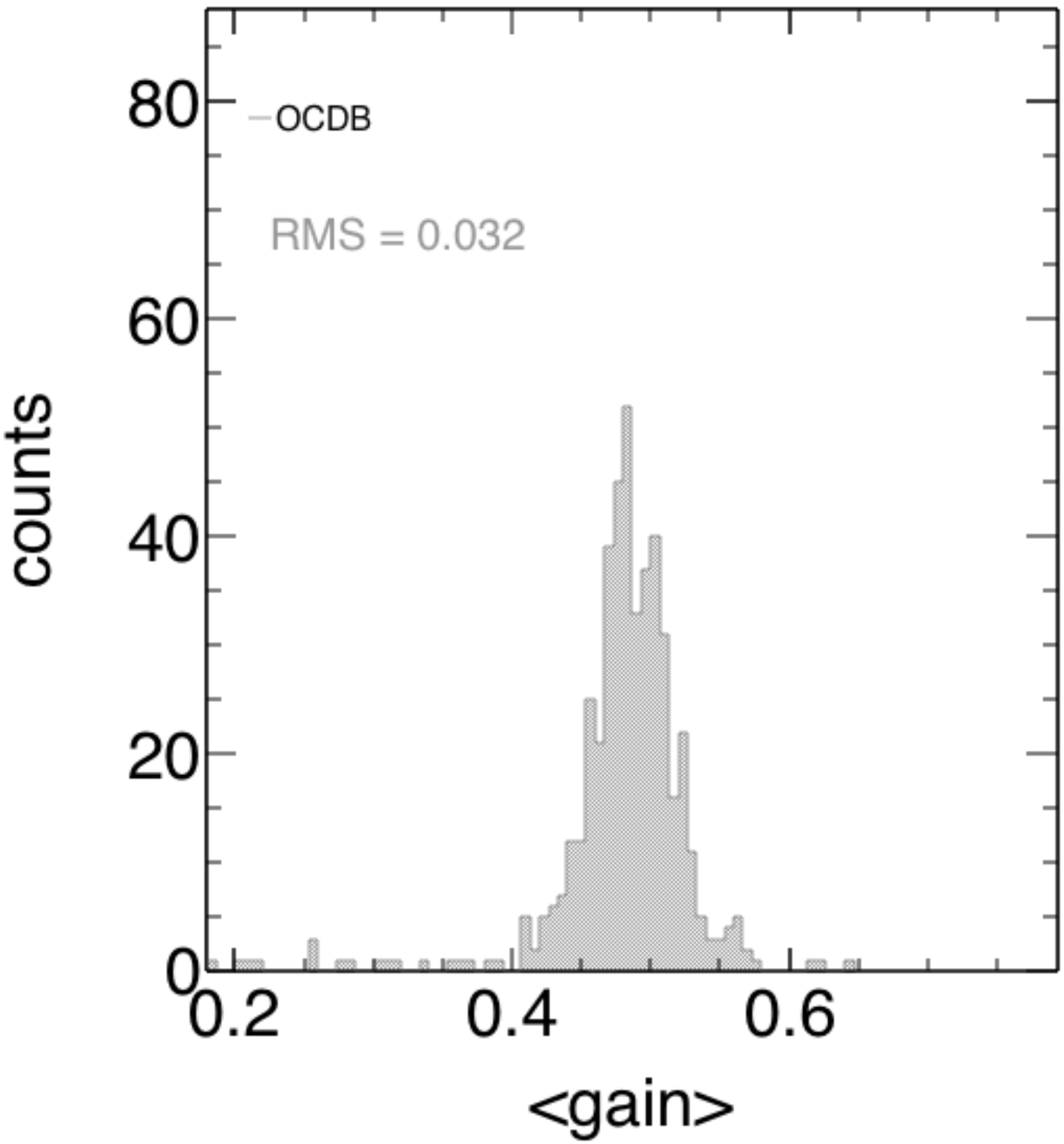
- Green: Polar angle dependence corrected.
- Red: Polar angle dependence and pad size dependence corrected.

TRD Chamber Gain

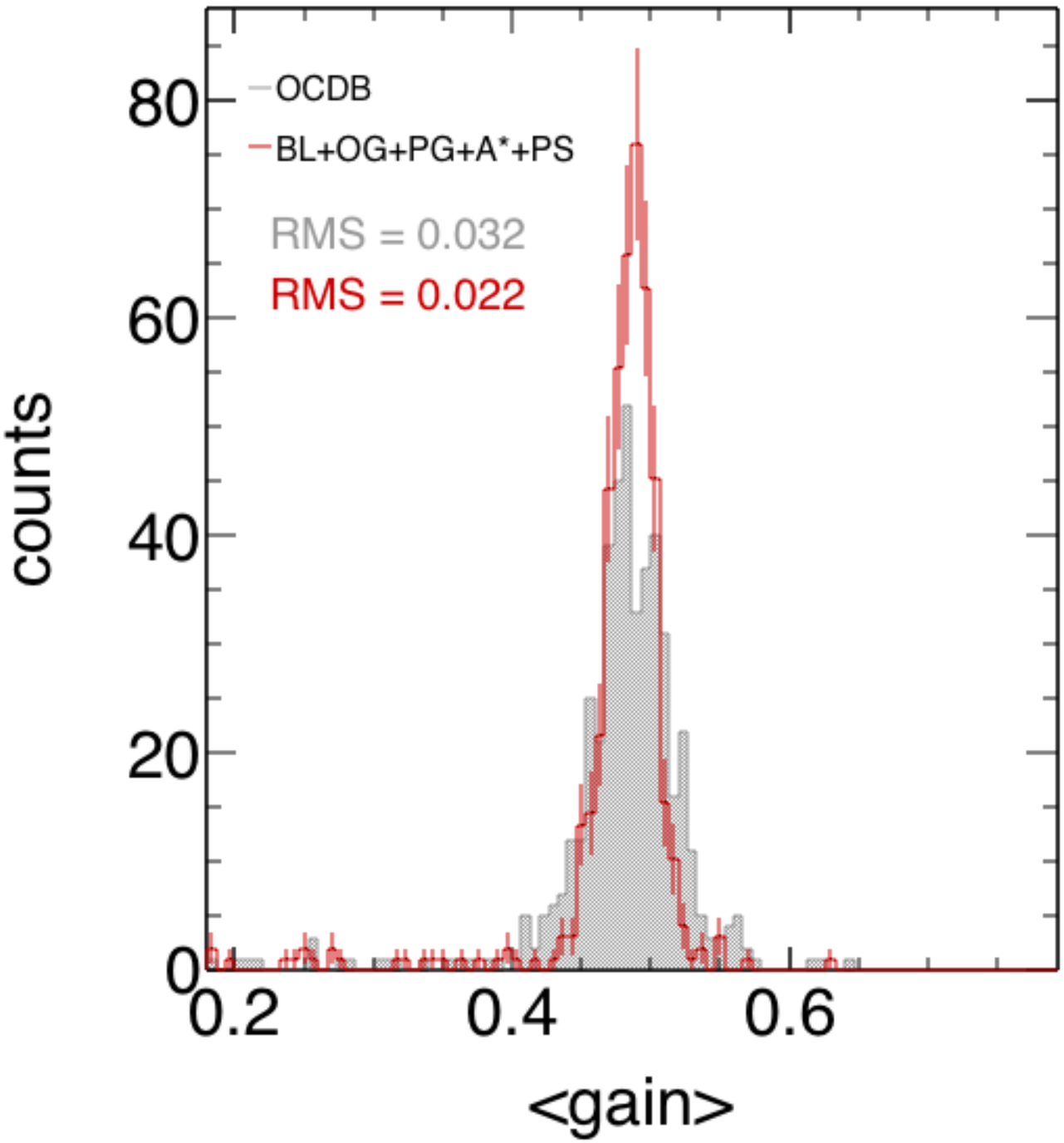


- Red: Polar angle dependence and pad size dependence corrected.

TRD Chamber Gain: Projected

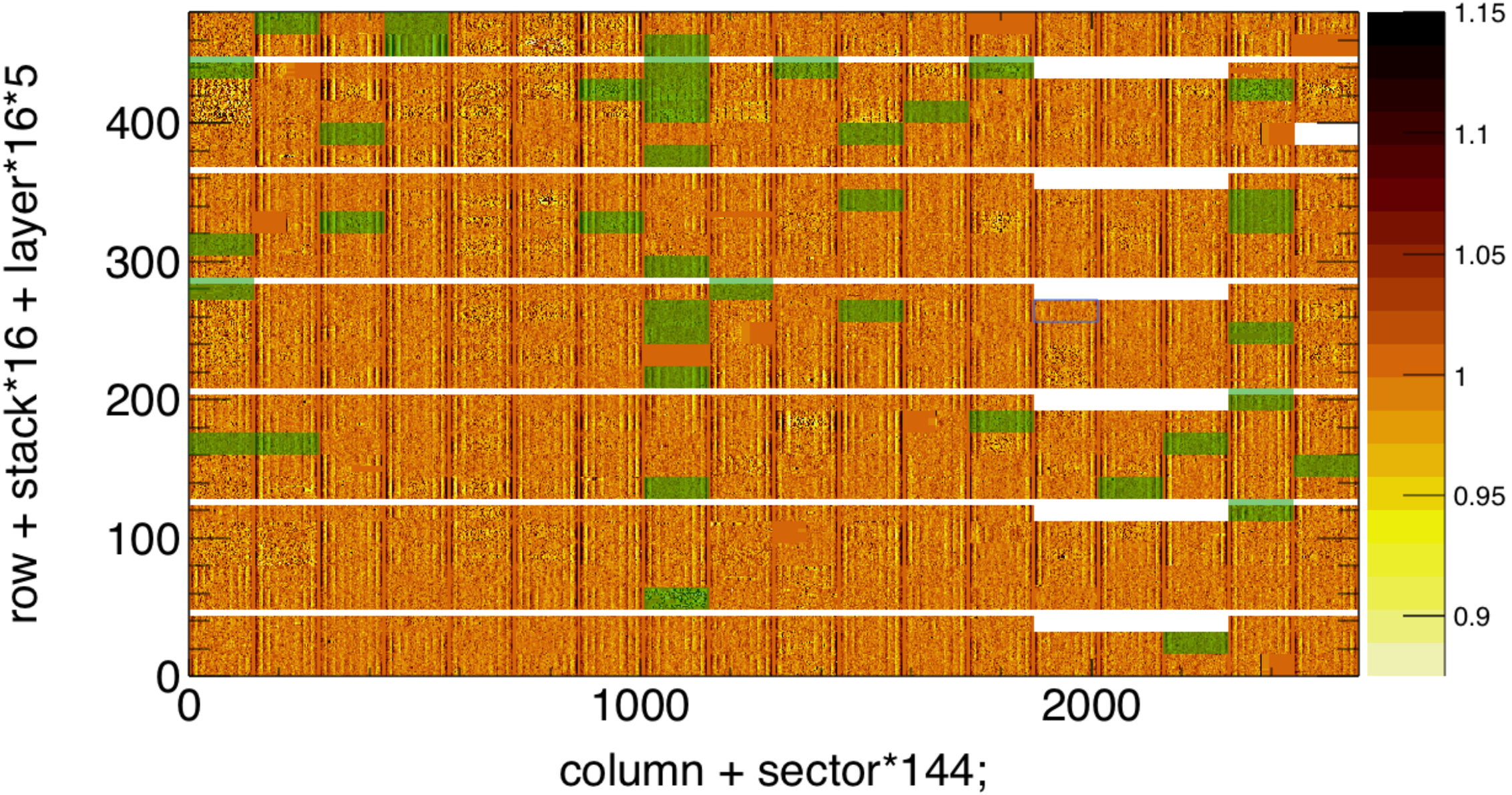


TRD Chamber Gain: Projected

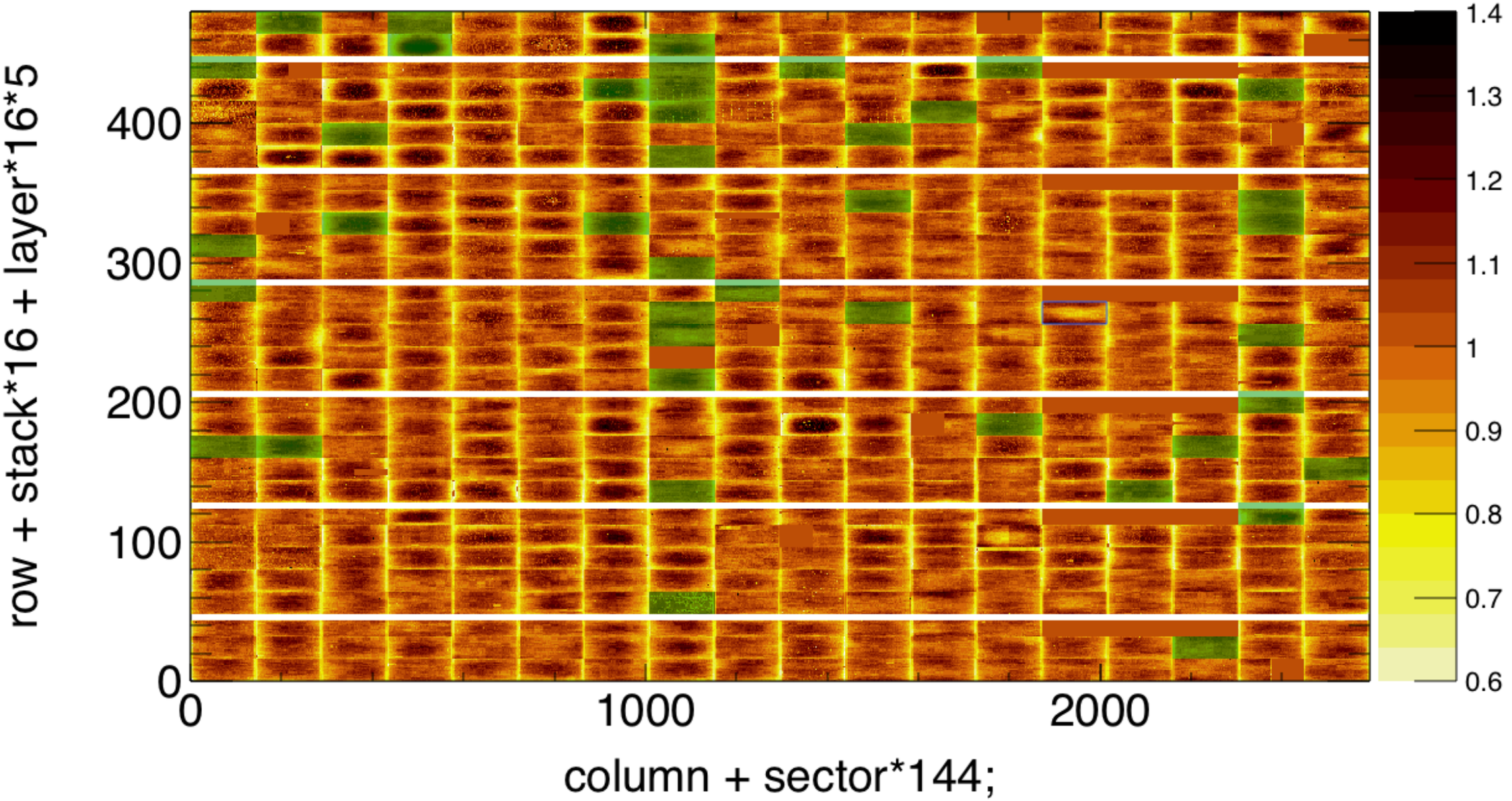


- RMS for chamber-to-chamber gain correction was reduced by about 50%.

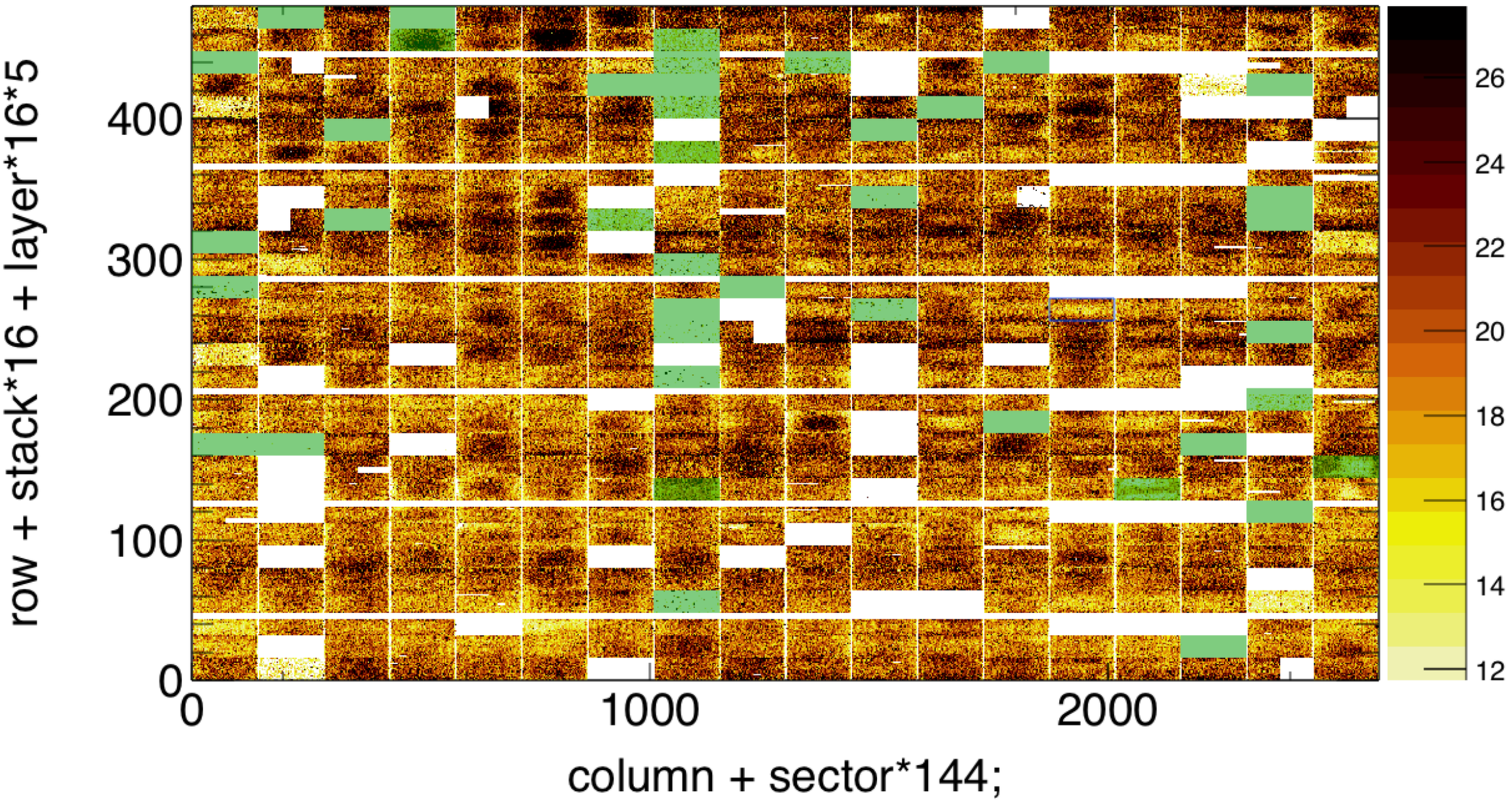
TRD online gain (partly Krypton)



TRD offline gain (full Krypton)

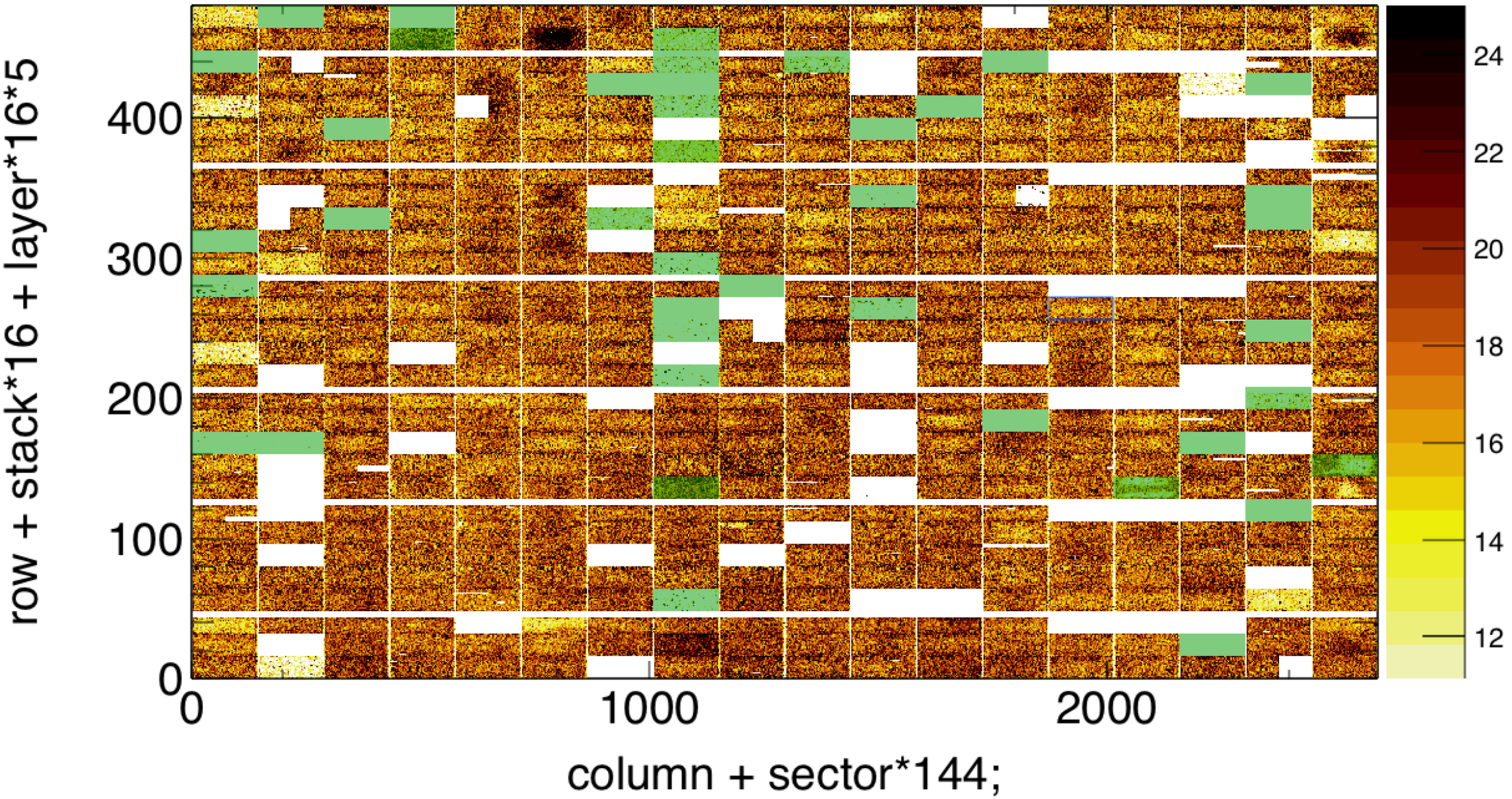


TRD online gain corrected



- Shows similar structures as the Krypton calibration
  → alternative approach but needs more statistics and run calibration.

TRD full correction (except chamber gain)



- Doesn't look too flat…

Conclusions

- Chamber-to-chamber calibration seems to have systematics which might be artifacts of the calibration (clustering) procedure.
  → polar angle dependence which might be overcorrected for low momenta tracks.
- <pad ADC> based on digit data matched with TPC tracks clearly shows a pad size dependence → mainly geometrical effect.
- “Fluctuation” of relative chamber-to-chamber calibration can be improved by about 50% with three global parameters (one for theta, two for pad size).
- Chamber gain distributions seem not to be flat after Krypton calibration…