



Calibration of ALICE pixel chips

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Project overview

- The ALICE Inner Tracking System (ITS) consists of multiple layers of high-resolution pixel chips
- Pixels produce a signal if hit; the pixel's location is recorded and sent to the detector's output
- Due to variations in the manufacturing, pixels need calibration to prevent excessively high or low response rates

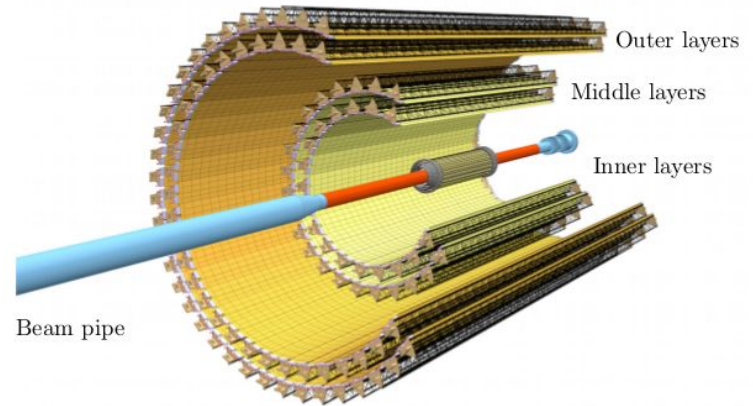
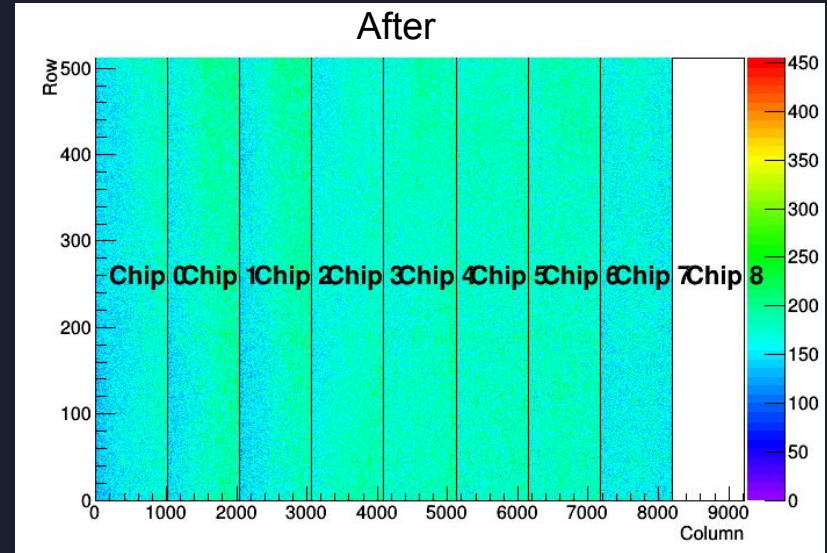
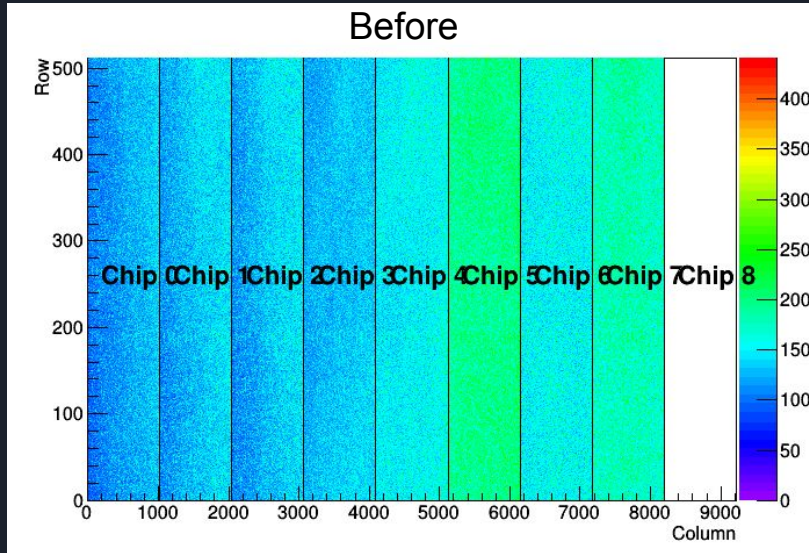


Figure 5.2.: Layout of the upgraded ITS, taken from [64].

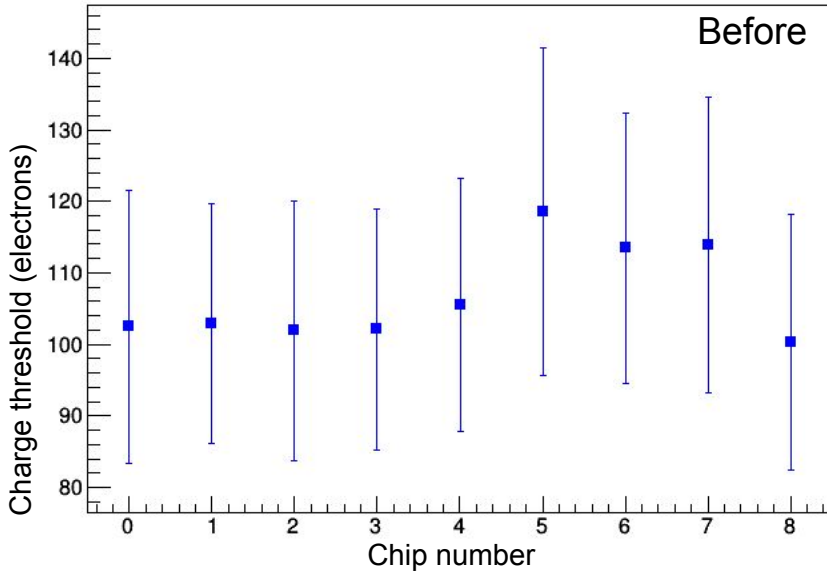
Before and after basic tuning

- Chip-to-chip differences in threshold may cause systematic errors
- Tuning guarantees a response to particles at the desired energy: ITHR and VCASN
- Chip behavior is now largely uniform

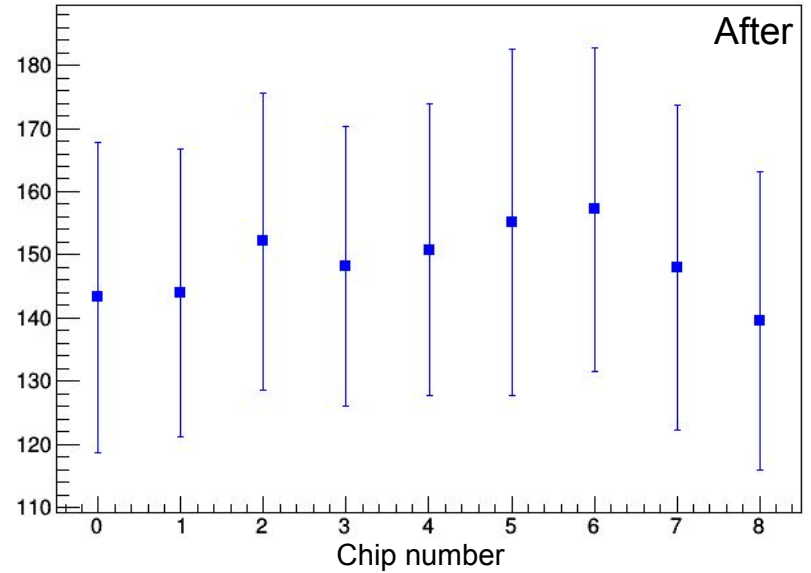


Combined tuning and its effects

Mean threshold per chip, target=100, RMS error=9.276254



Mean threshold per chip, target=150, RMS error=5.594542



- Tuning over either ITHR or VCASN produces uneven results
- Solution: Tune VCASN for an entire HIC (Hybrid Integrated Circuit; 9-14 chips), then tune over ITHR for each chip

GUI implementation

- Above calibration involves ~8 different routines
- ThresholdScan will be used in combination with multiple other scans (fifo, endurance, etc.)
- Current goal: Incorporate ThresholdScan into a GUI that facilitates testing
- GUI should be able to run scan using methods (init(), beginLoop(), finalize()) that vary from scan to scan, without “knowing” about any of the details of implementation





Challenges and current status

- Done: Classes and relevant methods, outline for info passing; scan is working properly
- Need to use the same methods for scans with different execution (finished)
- Need a way to identify which chips correspond to which HIC
- Need to permanently set VCASN and ITHR of chip