Activities on the performance of bent ALPIDE chips

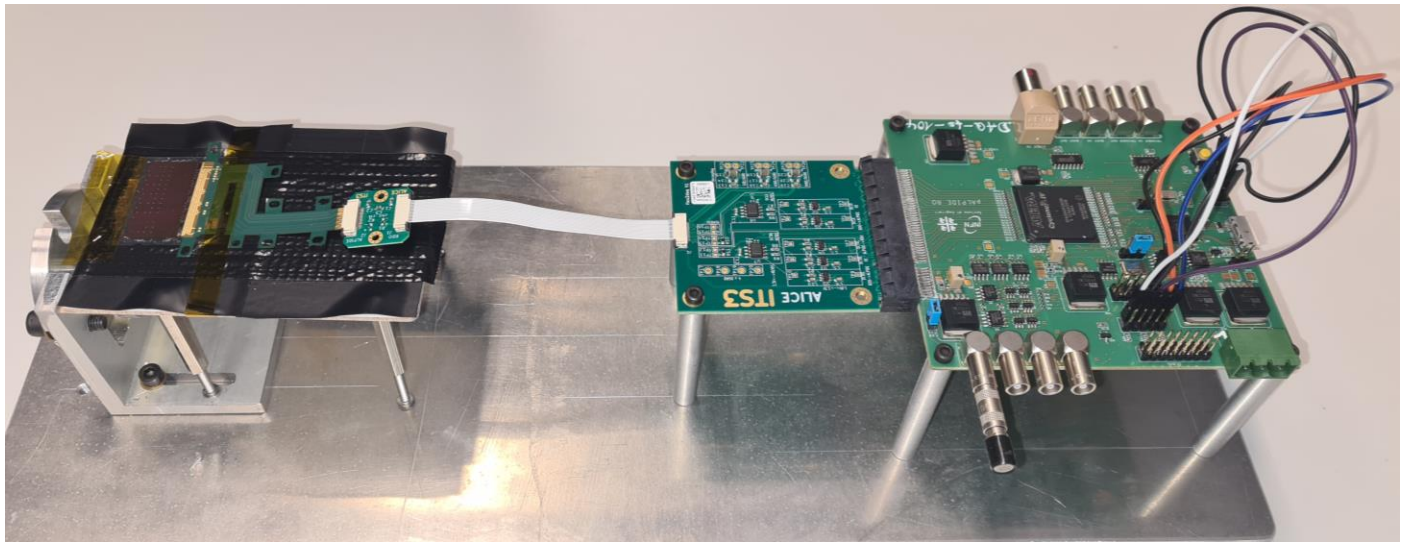
ITS3 update meeting. Bari, 10/02/2022

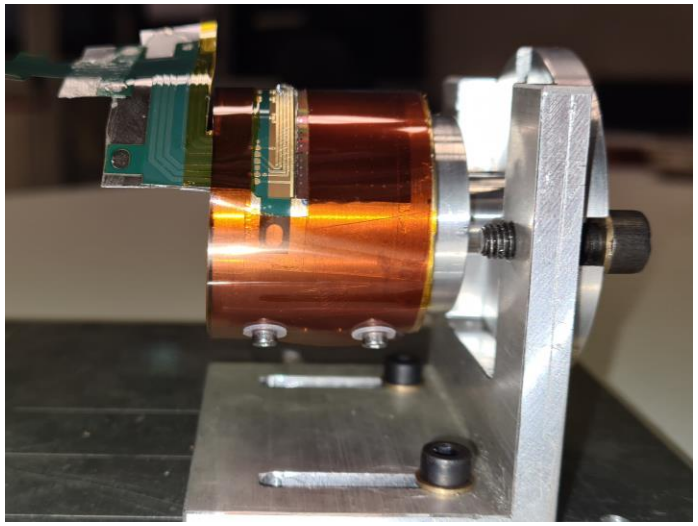
Arianna Torres

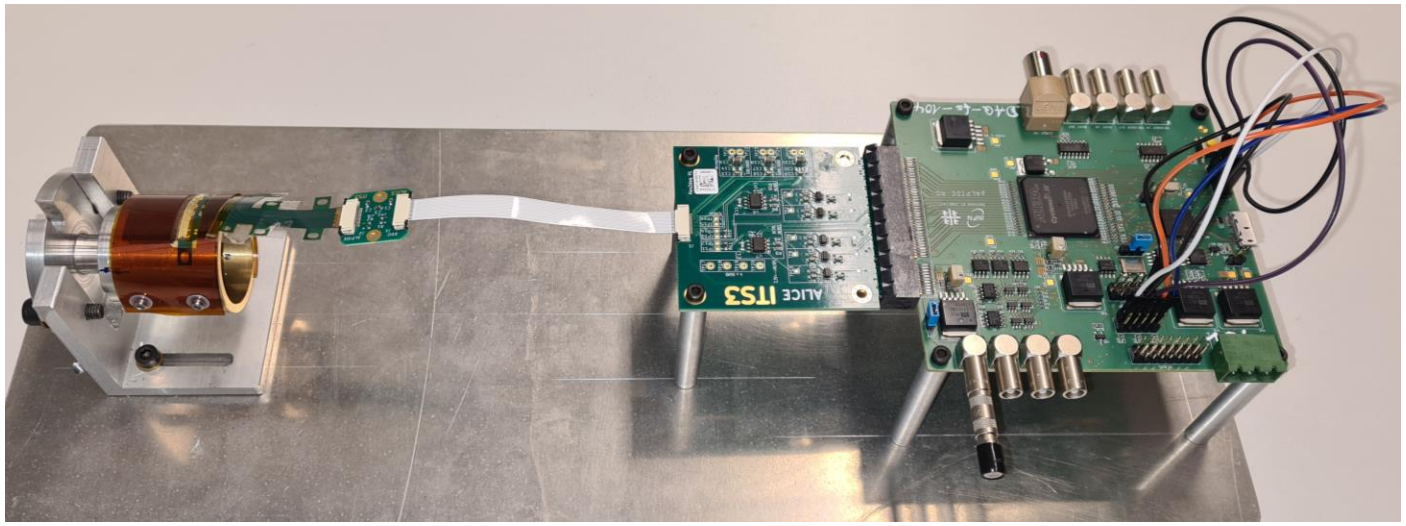
Electrical characterization of single-ALPIDE

All tests were performed and their results compared for three positions of the chip:

1) Original flat configuration (flat1).
2) Bent at a radius of r=18mm (bent1).
3) Flat position, turned back by manual unbending (flat2).



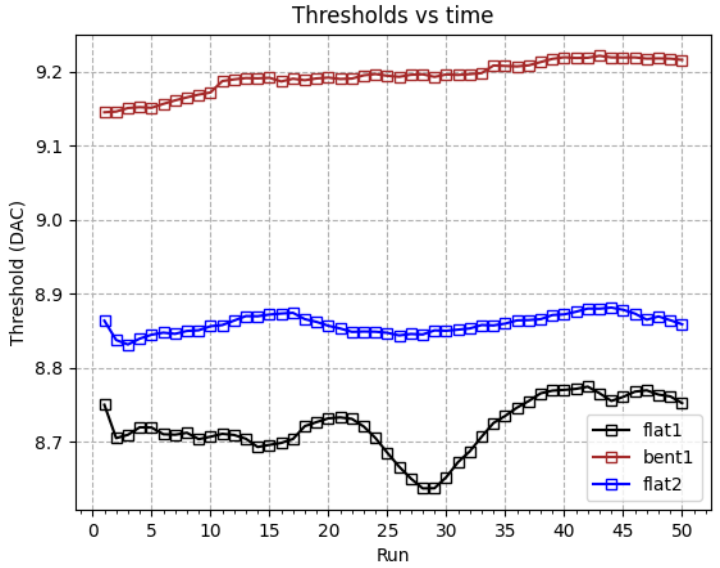


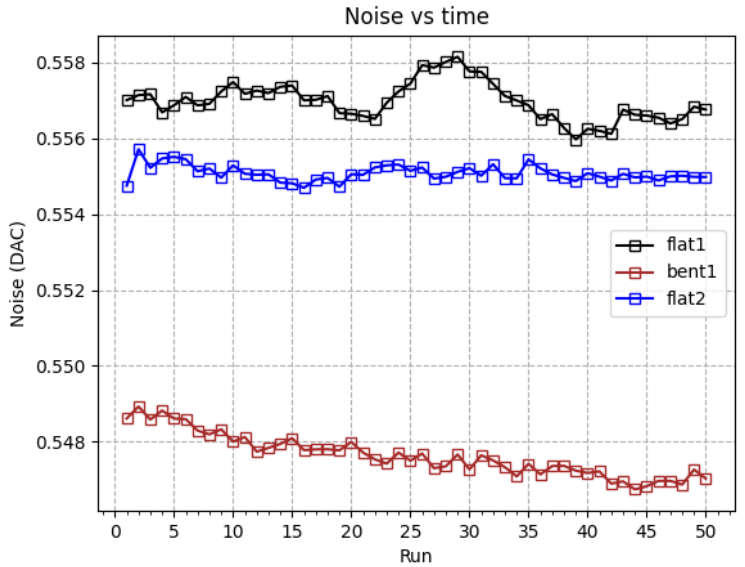


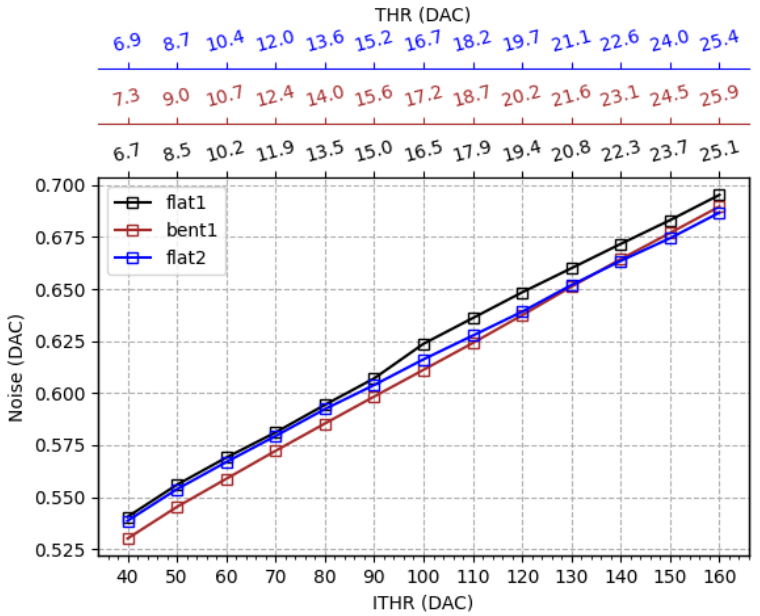
Evaluation of main parameters steering the chip functioning (Threshold, Noise, Fake-hit rate)

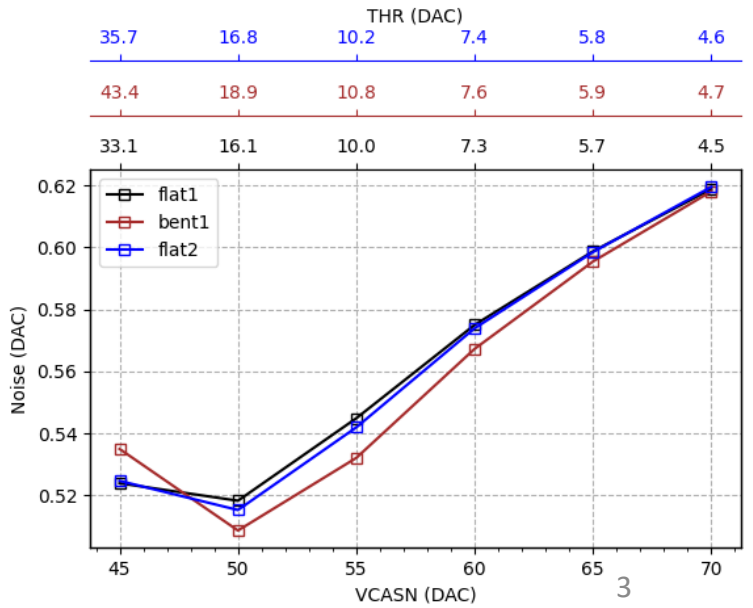
The scan of each parameter is repeated 50 times, running the data taking consecutively under the same conditions (ITHR=51, VCASN=57 DAC).
Threshold scans: ~50min each run
Total time covered ~40h

Variables were measured over DAC ranges.
ITHR = 40-160 DAC
VCASN = 45-75 DAC





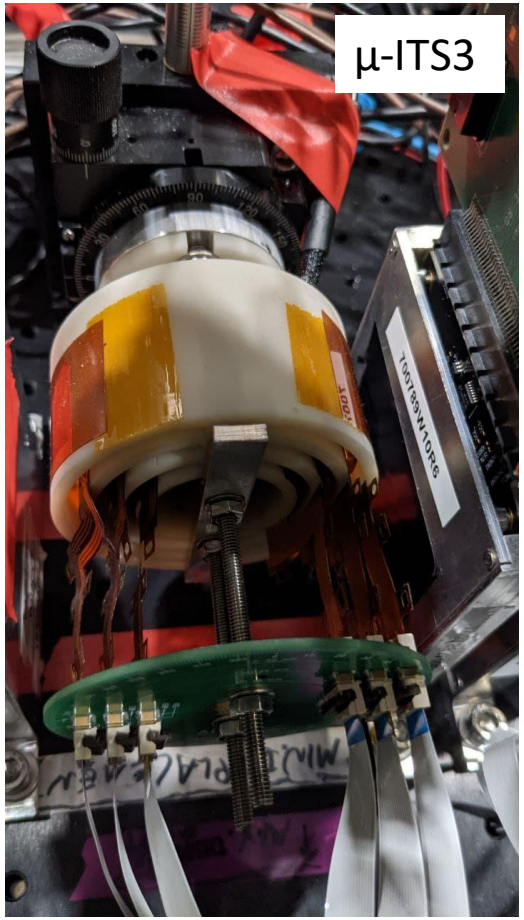


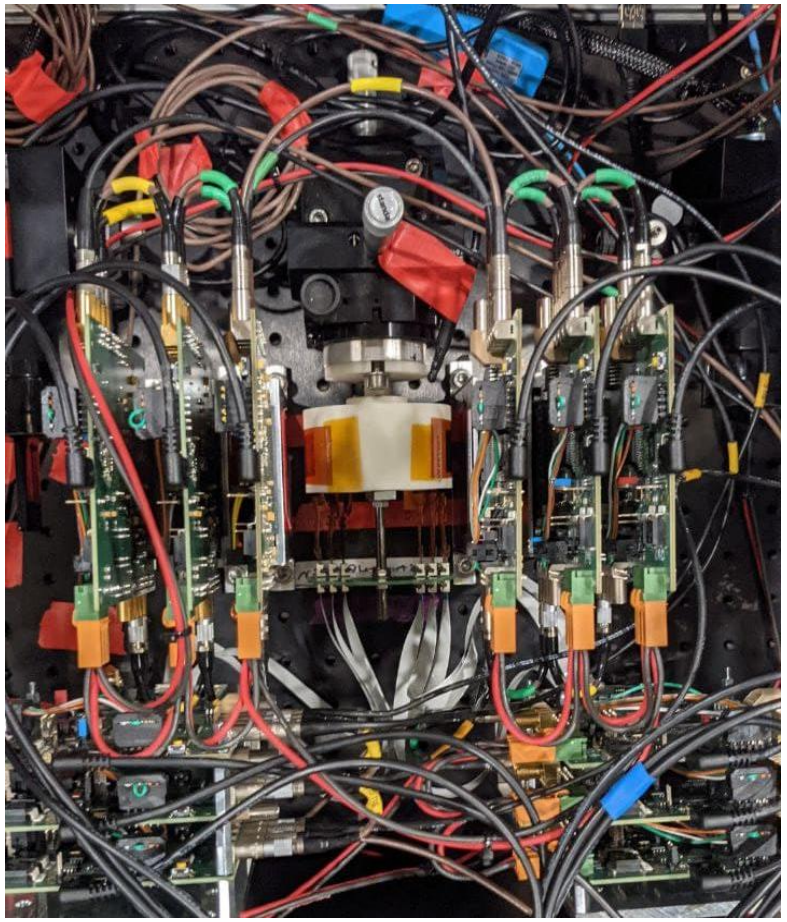


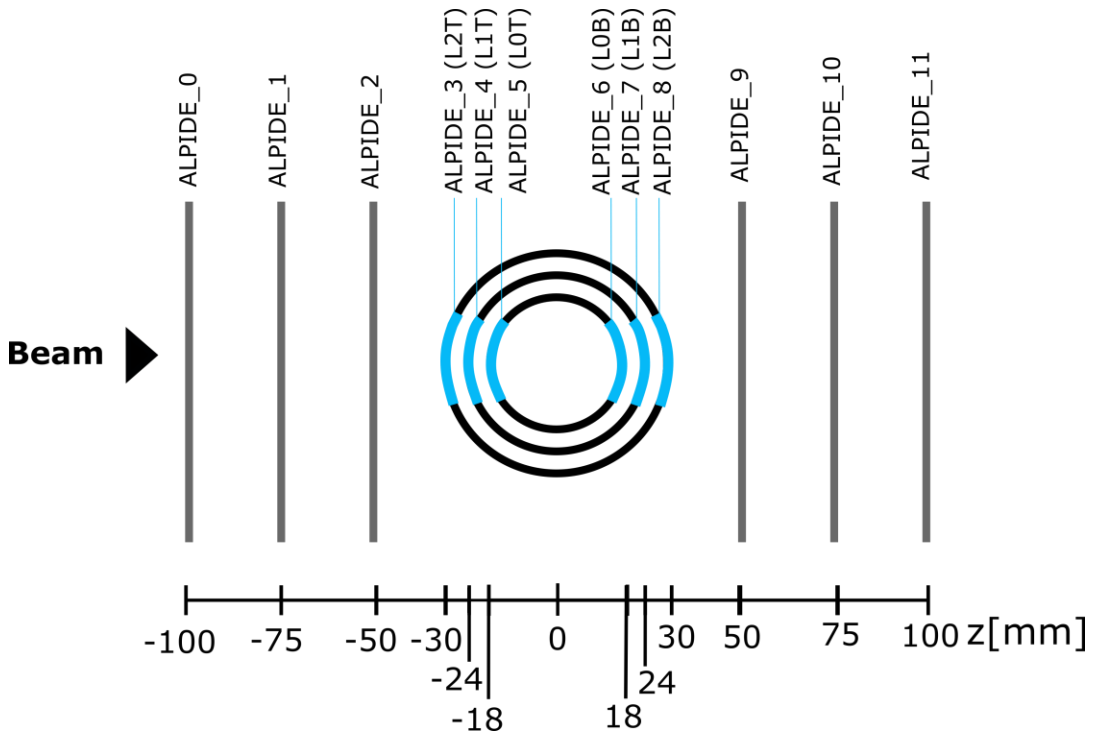
In-beam performance test of bent ALPIDE chips

Analysis of data collected during a testbeam campaign at CERN SPS in July 2021.

A beam telescope featuring six flat ALPIDE chips as reference detectors was used to measure the performance of other six ALPIDE chips, bent at the foreseen ITS3 layer radii, composing the so called micro-ITS3.







Data processing

Corryvreckan

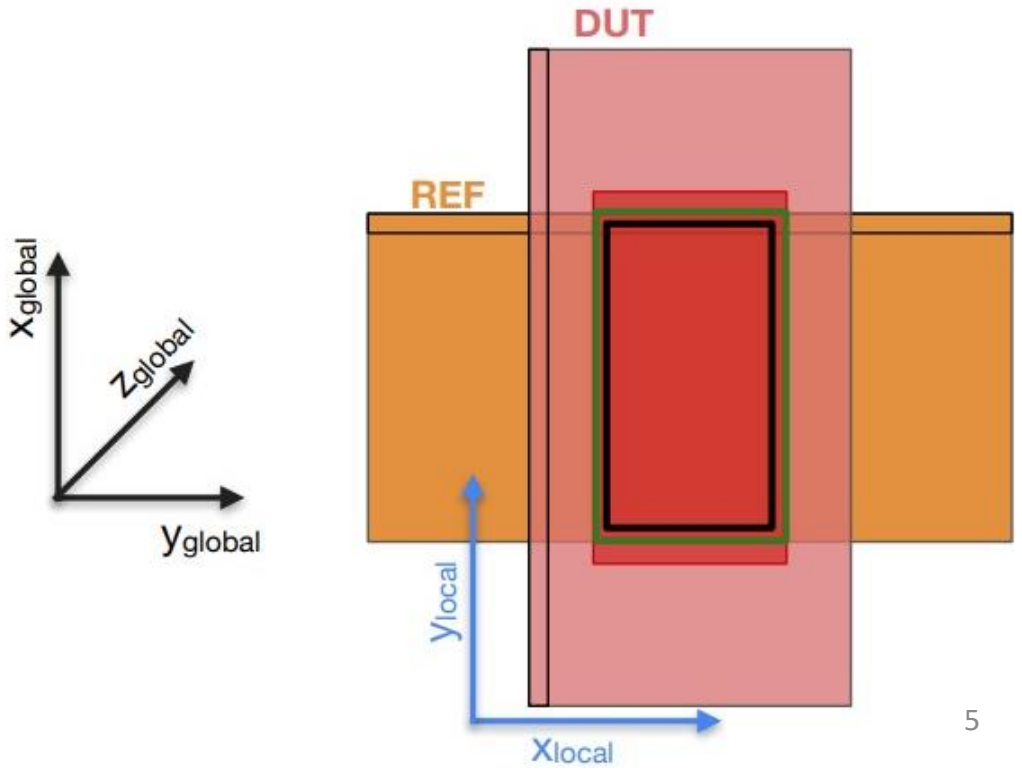
Test beam data reconstruction framework

https://project-corryvreckan.web.cern.ch/project-corryvreckan/

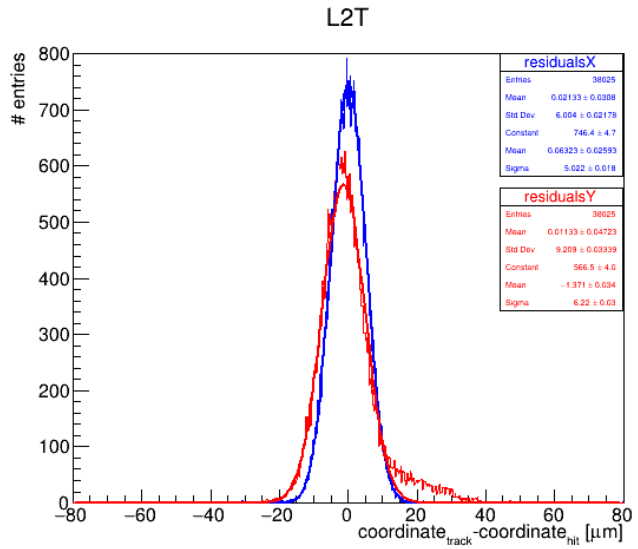
Monthly ITS3 WP3 hands-on session: Getting started with testbeam analysis: February 11th, 2022
https://indico.cern.ch/event/1126532/

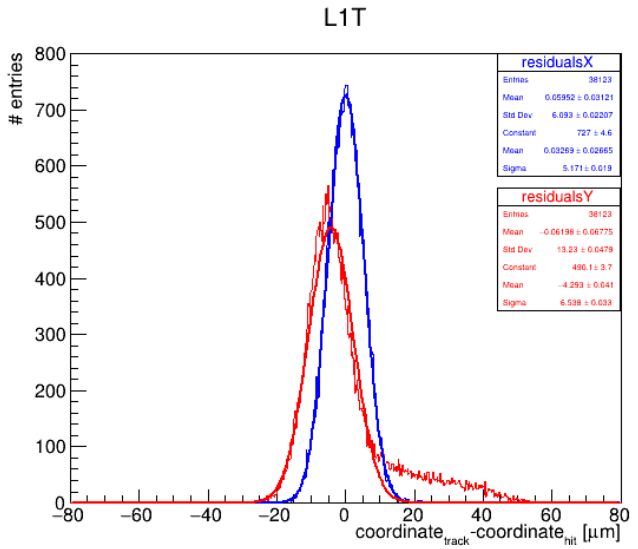
[AlignmentDUTResidual]

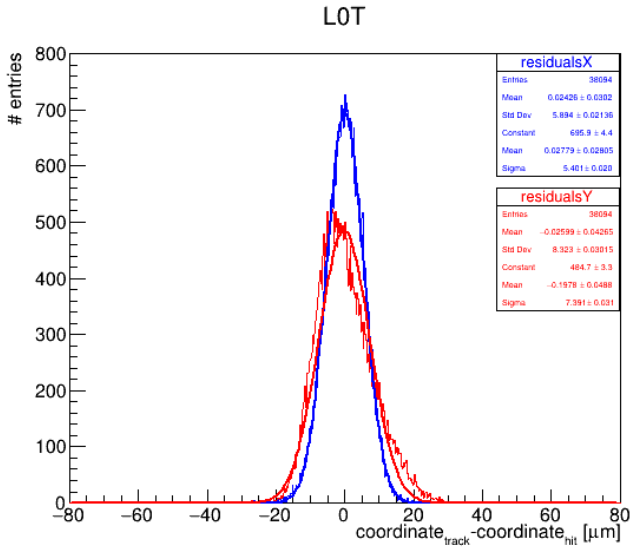
Iterative variation of DUT position and rotation to minimize the residuals calculated from the track intercepts with the plane.

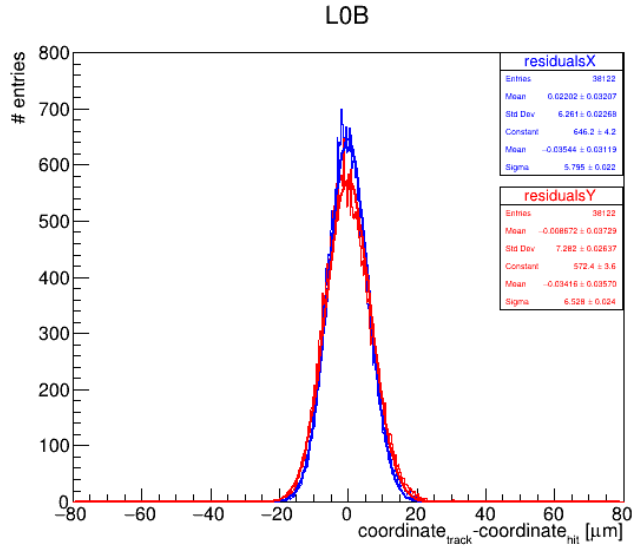


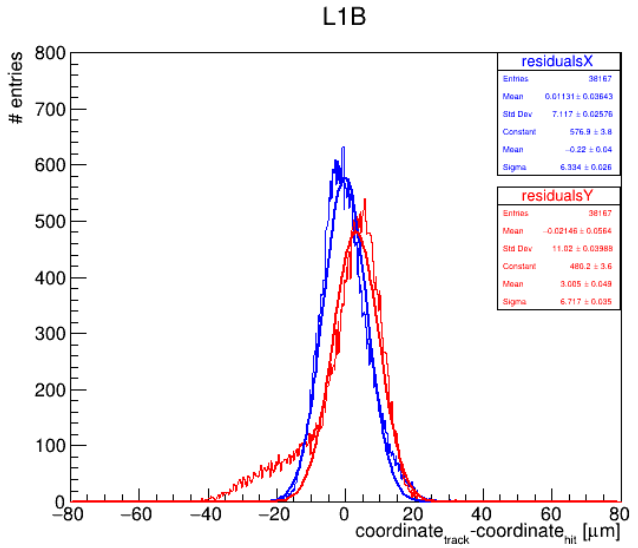
Residuals after software alignment

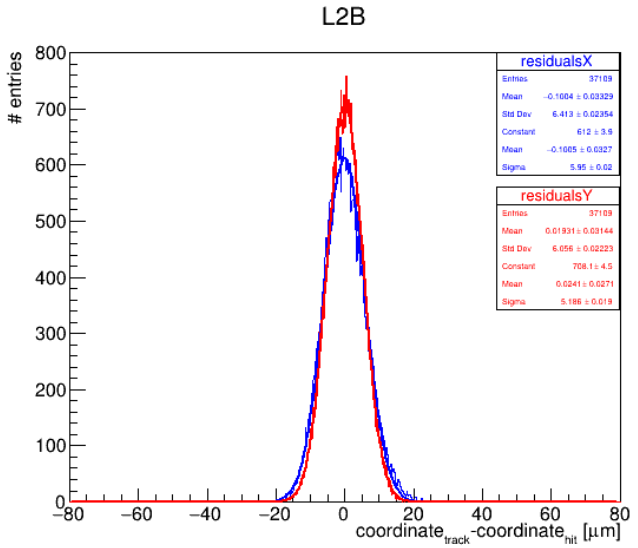






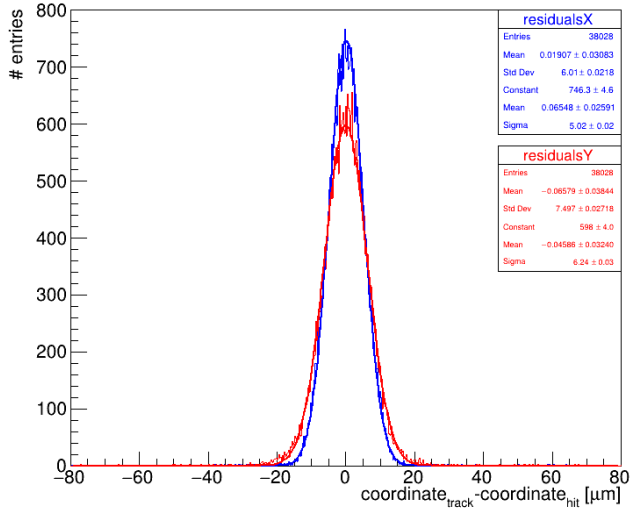




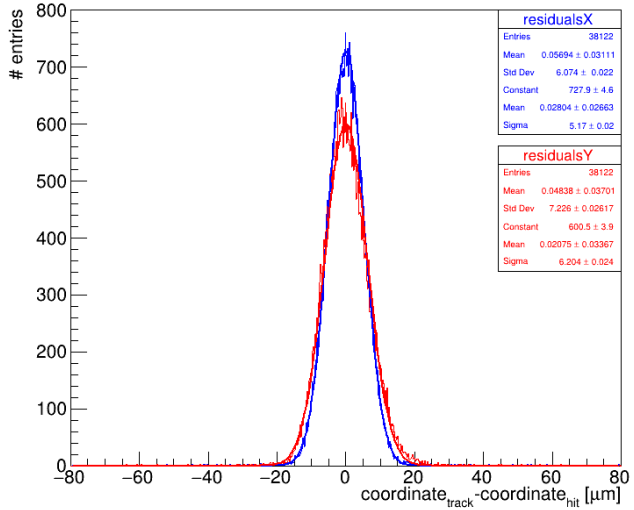


Residuals after further alignment

L2T



L1T



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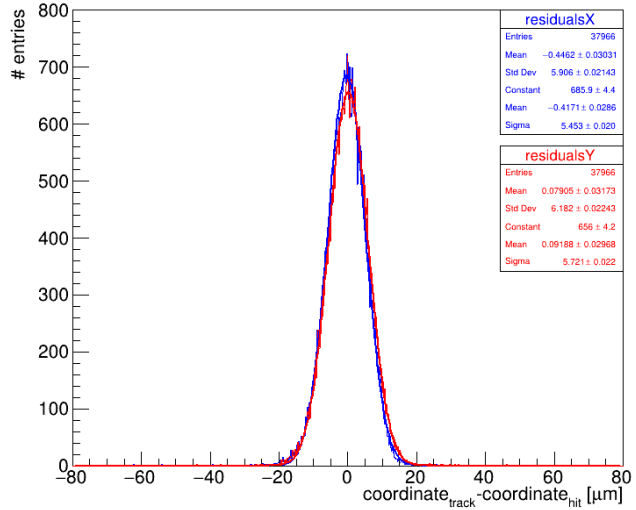

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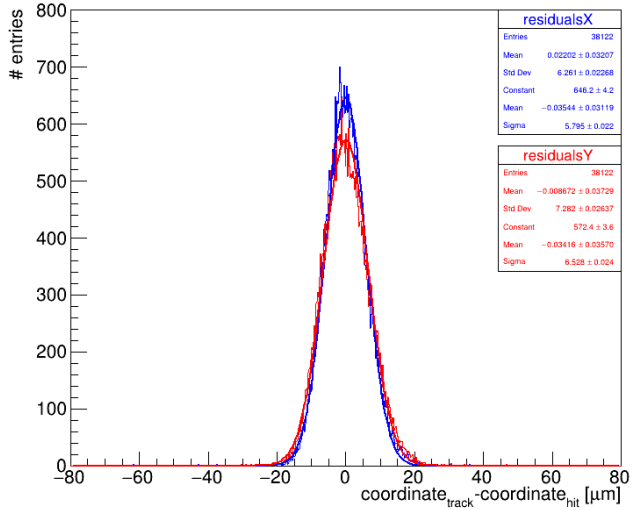
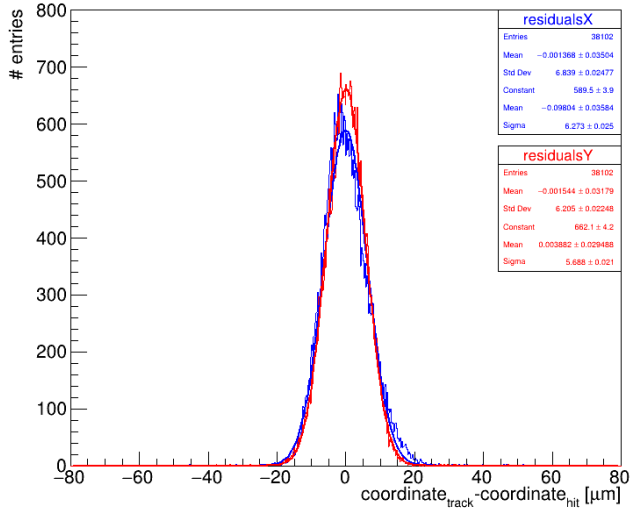


L1B



L2B