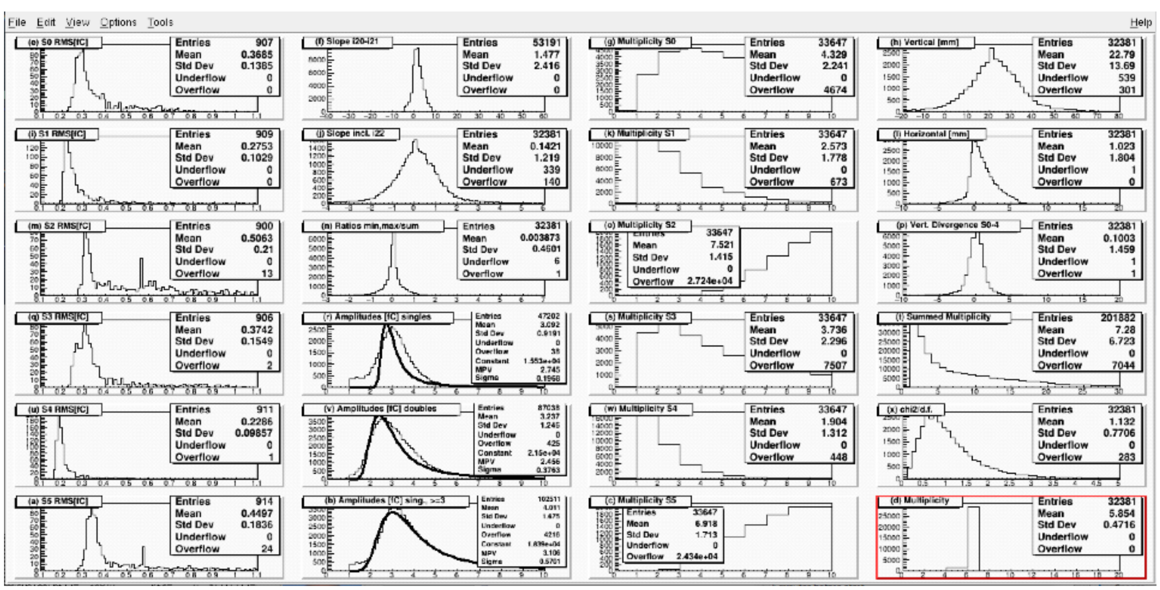
Multiplicities of hits in Run_20200316_162107.dat:
The average number of tracks/cycle in that run is 1.3, so that is the expected mean in the absence of background hits. In plots g-c (column-2) below is plotted the multiplicity of hits, after assembling sequences of signals into clusters, called hits here. In this representation sensors S1 and S4 really shine in as much as they have a peak at one hit per cycle and decreasing numbers of doubles, triples and so on. Up to 10 hits/cycle are displayed and determine the means for this restricted sample. The overflow (~500) of >10 hits/cycle in 33,000 cycles in negligible.

Sensors S0 and S3are somewhat worse in as much as the peak multipliities are 2 or 3 and there are ~5000 cycles in the overflow with >10 hits/cycle.

Sensors S2 and S5 show up as really sick since the distributions peak at 10 hits/cycle or higher, and for 2/3 of cycles there are more than 10 hits per cycle. Nevertheles, because of the high spatial resolving power of the sensors, hits belonging to tracks fitted in the good sensors can still be isolated.

In column-0 the noise/strip in each sensor is plotted. S1 and S4 have the lowest noise and very little tail to higher value. S2 and S5 are the worst, with high average noise and tails to very high values. High noise results in high multiplicities of background hits.

Summary of multiplicities (mean defined up to a multiplicity of 10):
S0 = 4.3 hits/cycle
S1 = 2.5 hits/cycle
S2 = 7.5 hits/cycle
S3 = 3.7 hits/cycle
S4 = 1.9 hits/cycle
S5 = 6.9 hits/cycle



Tracking efficiency:
Fitting tracks to sensor hits and selecting the best one in each cycle results in 32,361 tracks with 4 to 6 hits in 33,647 cycles or 97 % acceptance. That would indicate a sensor efficiency of >99 %. Various other

methods yield individual efficiencies between 97 and 99 %. In plot d in column-3 the multiplicities of accepted hits are shown with 6 hits by far exceeding lower counts. In detail, there are equal numbers (1579) for 4- and 5- hit tracks, while the 6-hit tracks number 29,223. If we can assume a binomial distribution we can deduce from the ratio of 6-hits to 5--hits again an efficiency of 99 %.

Amplitued Spectra:
In column-1, plots r through b are displayed amplitude spectra, in r for single hits, v for doubles and b the sum of singles and triples (plus a few events of higher multiplisity).
The Landau fit does not match the data for single hits (plot-r, column-1 row-3, starting at 0). I think it may be supporting my hypothesis that only events with "regular" energy deposit, not in the Landau tail, result in single hits. It appears that the fit tries to be in agreement with the tail, an important feature of the Landau distribution, does not find it and comes up with the weird peaked shape.

The strips have this unique shape, 25 um wide and 300 um deep. If there is a large energy deposit it means a knock-on electron with large energy (as I understand it) and that knock-on electron will leave the instrumented pixel and enter the neighboring dummy and is detected one strip further out. My tentative explanation for the triplets then is that they are originating in an instrumented strip and generate knock-on electrons to both neighboring dummies. The plot-b, col.-1 row-5 is the sum of singles and triples and gives a good Landau fit.

Plot-v, col-1 row-4 is the amplitude spectrum for the summed double hits and should be mostly tracks through a dummy strip.

For plot-b there are 103,000 entries, an MPV=3.1 fC and a mean of 4.0 fC. The mean equals the expected energy deposition in 300 um of silicon.

For plot-v there are 87,000 entries, an MPV of 2.7 fC and a mean of 3.1 fC.

I do not expect plots b and v to be pure samples of hits in instrumented and dummy strips, so the discrepancy in numbers, which in principle should be equal, is not surprising. There may be losses in double hits where one of the pair is small and the hit could end up in plot b.

Plot v in both MPV and mean is ~ 20 % lower than plot b.