HPTPC Analysis meeting

Seb Jones

Department of Physics & Astronomy
University College London

November 1, 2018

UsToF – DsToF matching

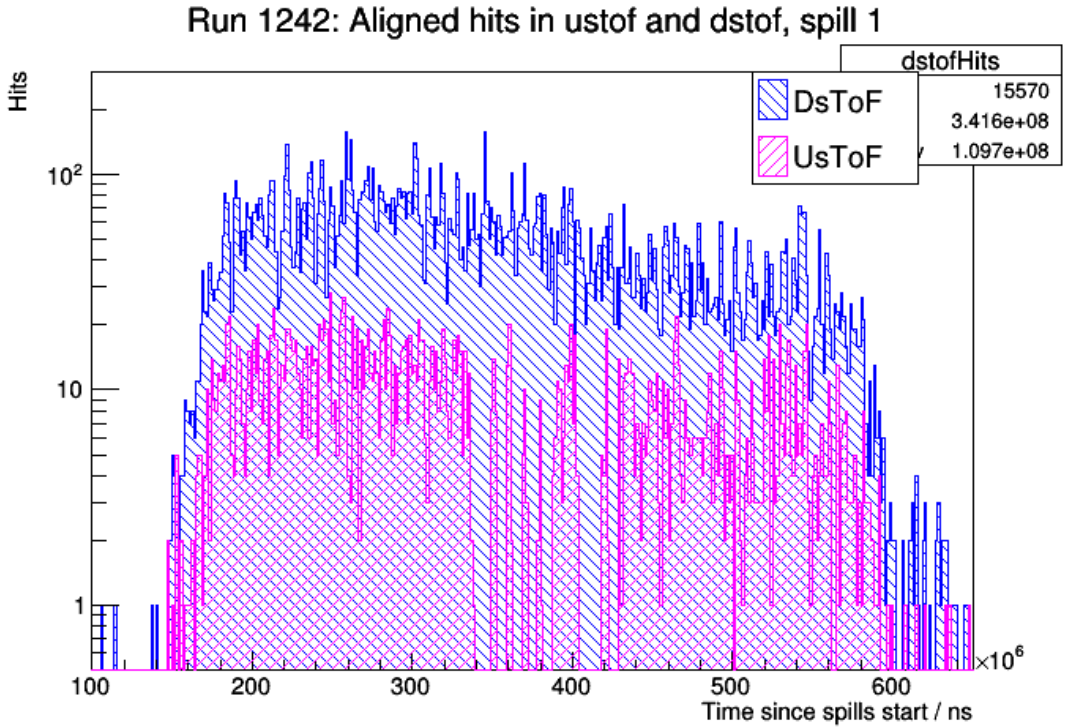
Files used

- UsToF: `Data_2018_9_9_b3_800MeV_4blocks_bendM5cm.root`
  - Start: 1536490758, End: 1536562524
- DsToF: Run 1242
  - Start: 1536523466, End: 1536527066
- These should be fairly typical running conditions – full moderator, 0.8 GeV/c beam

Procedure

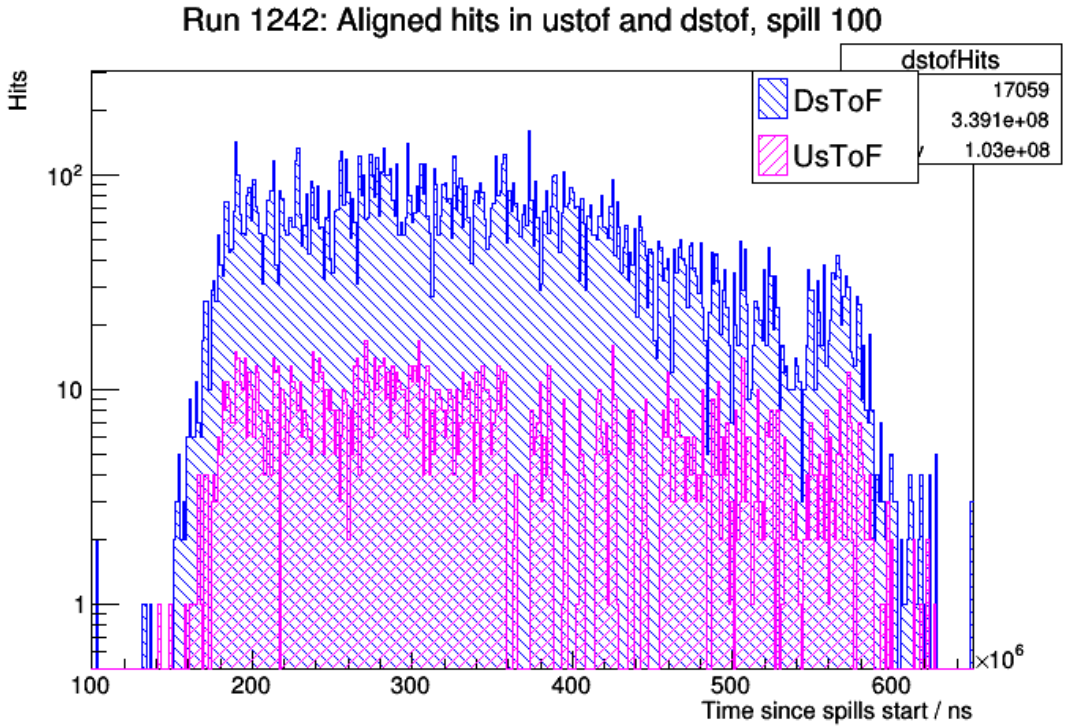
- Match beam signals with one another initially to measure the clock drift across entire run ($-2.78\mu s/s$ measured over 1 hour)
- For spill n, zero both UsToF and DsToF clocks at the spill signal and apply calculated drift from this point

Example: 1st spill



- For DsToF: these are *all* bar coincidences – no UsToF hit required
- For UsToF: these are the ToF wall hits (S3) which have an associated S1 (the first timing gate) hit
- Appears to be UsToF deadtime effects around 350ms

Example: 100th spill



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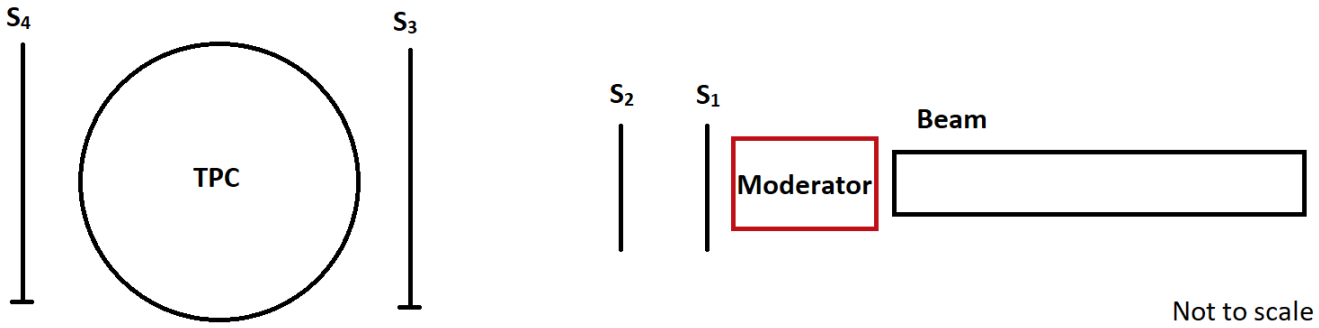
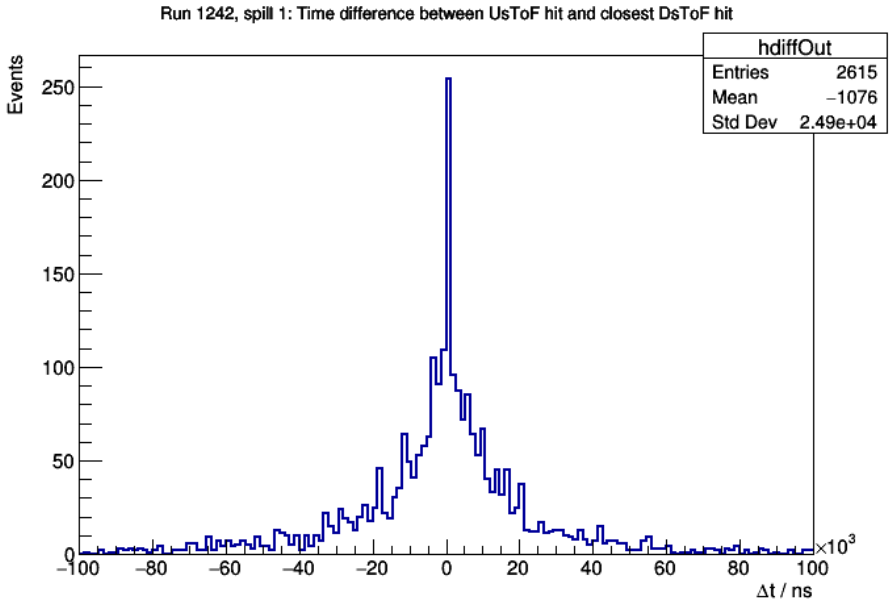
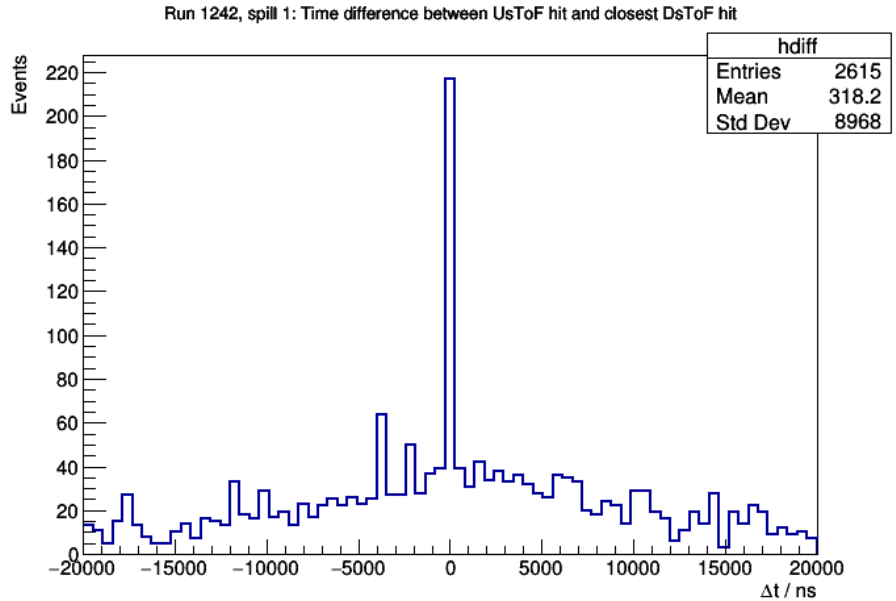
Naming conventions



- Becoming quite confusing calling things UsToF, DsToF (which one?)
- Easier (in my opinion) to just use S_{1-4} since UsToF files contain info from S_{1-3}

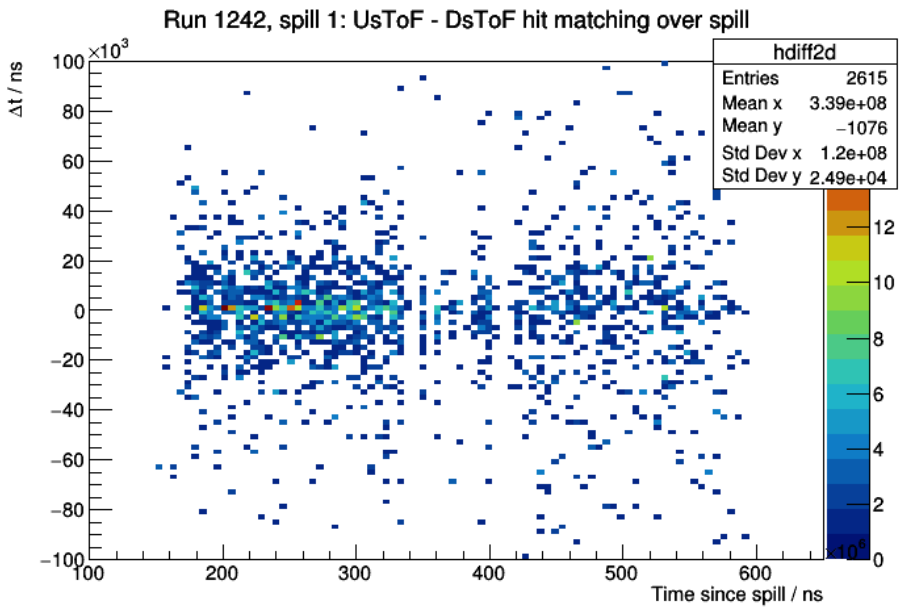
Hit matching

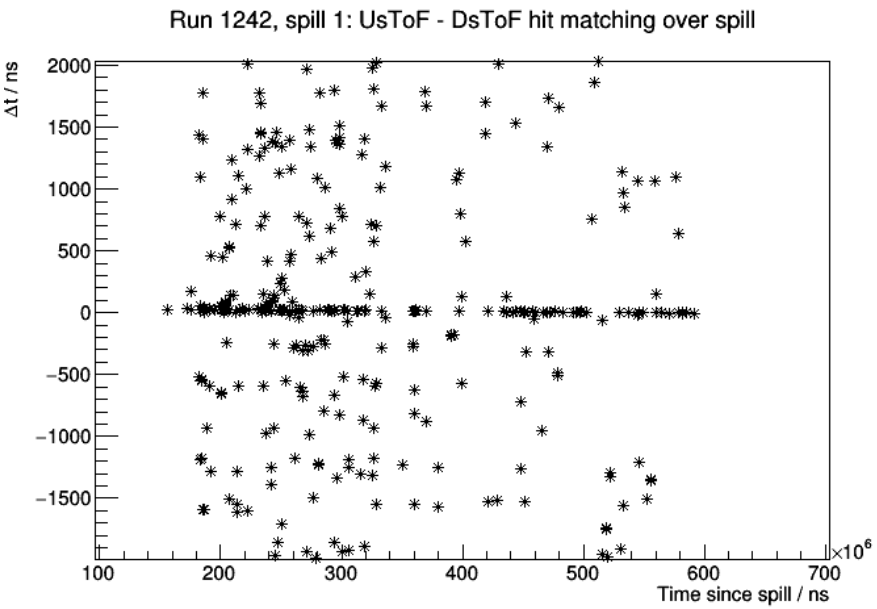




- Attempt to match each S3 hit with an S4 hit (many more DsToF hits)
- Have a peak near 0 ns, which is reassuring – not exactly there though
- Geometric factors, attenuation, imperfect efficiency will lead to unmatched hits
- Right is just zoomed version of left

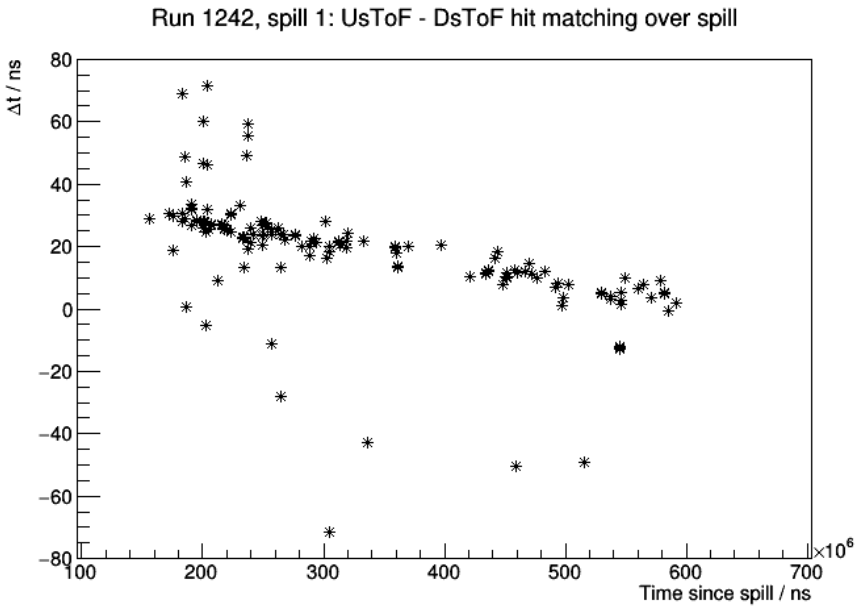
Hit matching

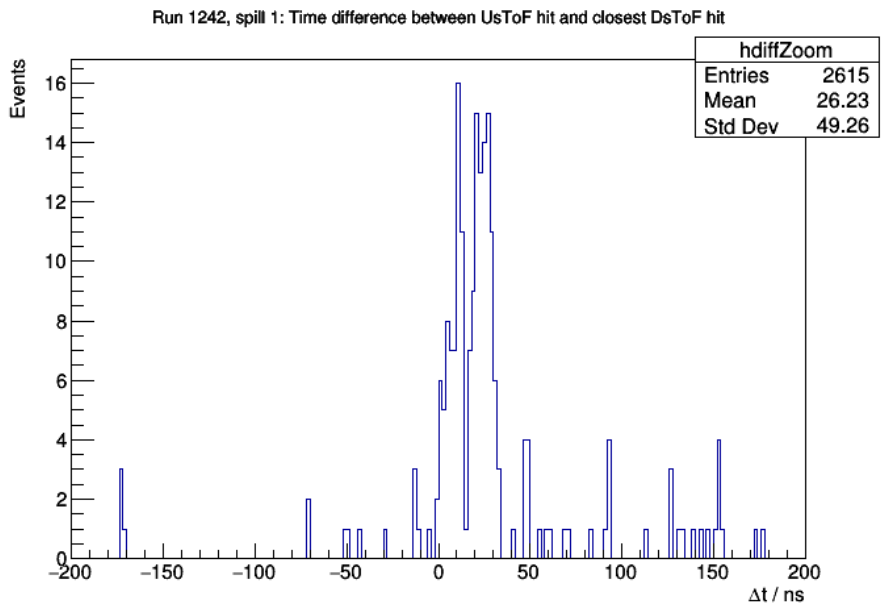




- These are for the same spill as the previous slide
- Seems that we have a number of hits that are being matched down to the ns level between the two systems!

Hit matching: spill 1

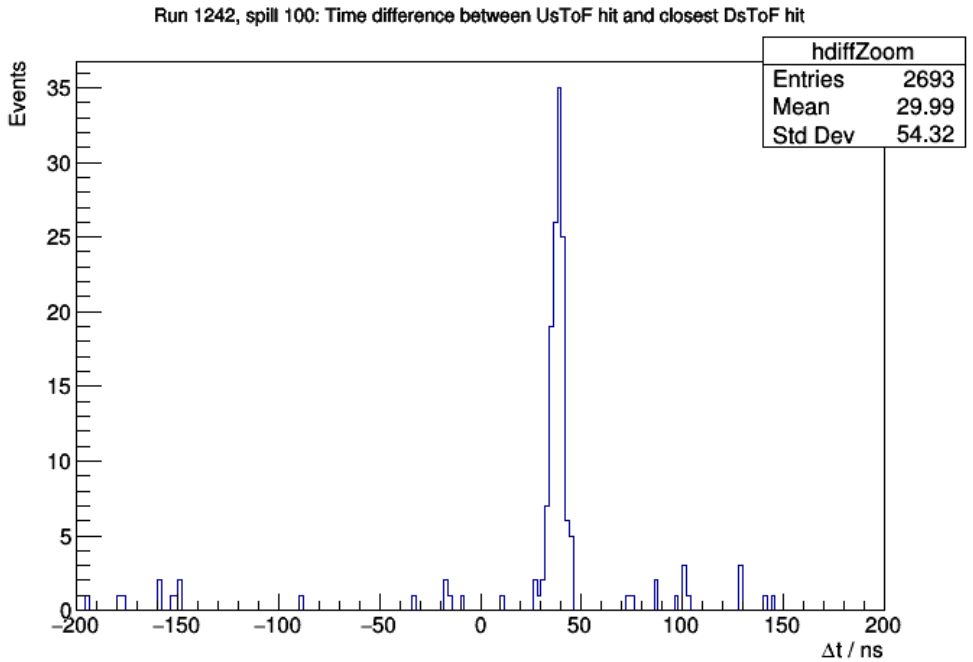




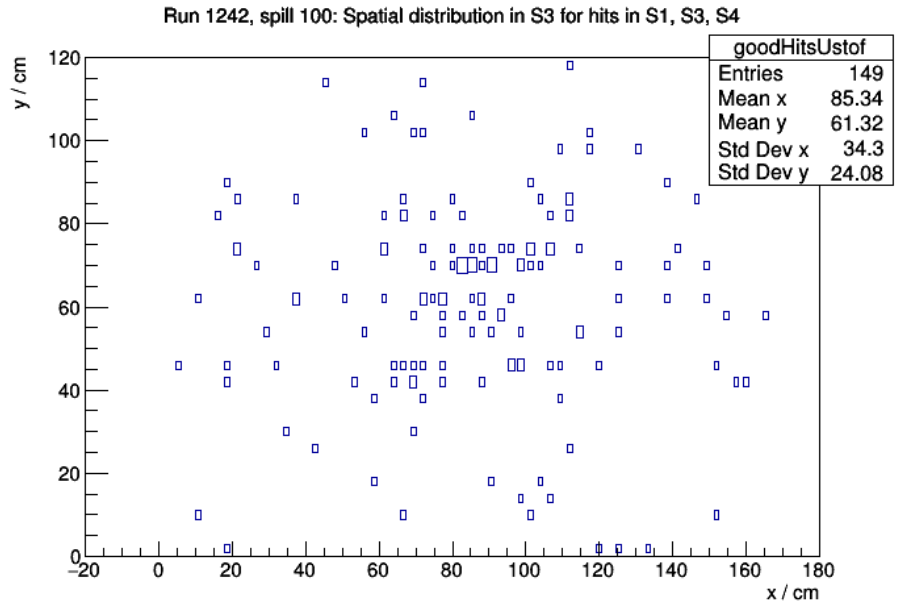
- However, zooming in further, drift correction has not been 100% effective – smearing of peak on left
- To get right for individual spills may need to calculate drift on smaller timescale
- Probably the next thing I'm going to look at today

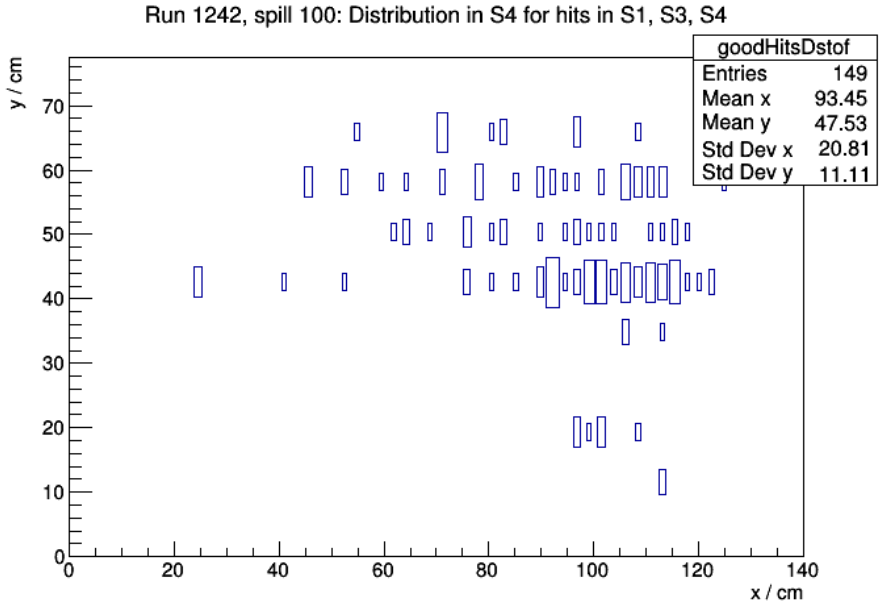
Hit matching: spill 100

- Drift correction seems to work very well at this particular point in run so will use as an example
- This plot is $S_3 - S_4$. These points were pretty close together so it seems we have a $\sim$30 ns offset between systems.

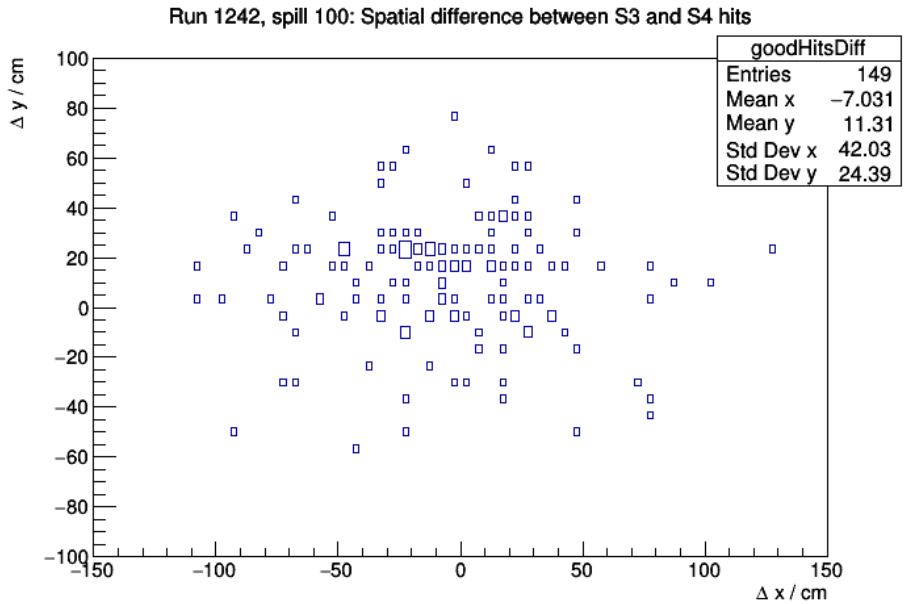


Spatial distribution of these hits: spill 100





- For these 'matched' hits ($-100\text{ns} < \Delta t < 200\text{ns}$) have plotted the spatial position in S_3 and S_4
- Note: these are not the same 'x' and 'y' on the two plots – they are specific to the detectors
- Need to do sum of these over many spills to get better idea of distribution



- Difference between the two plots on the previous slide
- Seemed to be roughly centred on (0, 0) – I think have my coordinate system the right way round