Background Studies

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On behalf of a number of people...

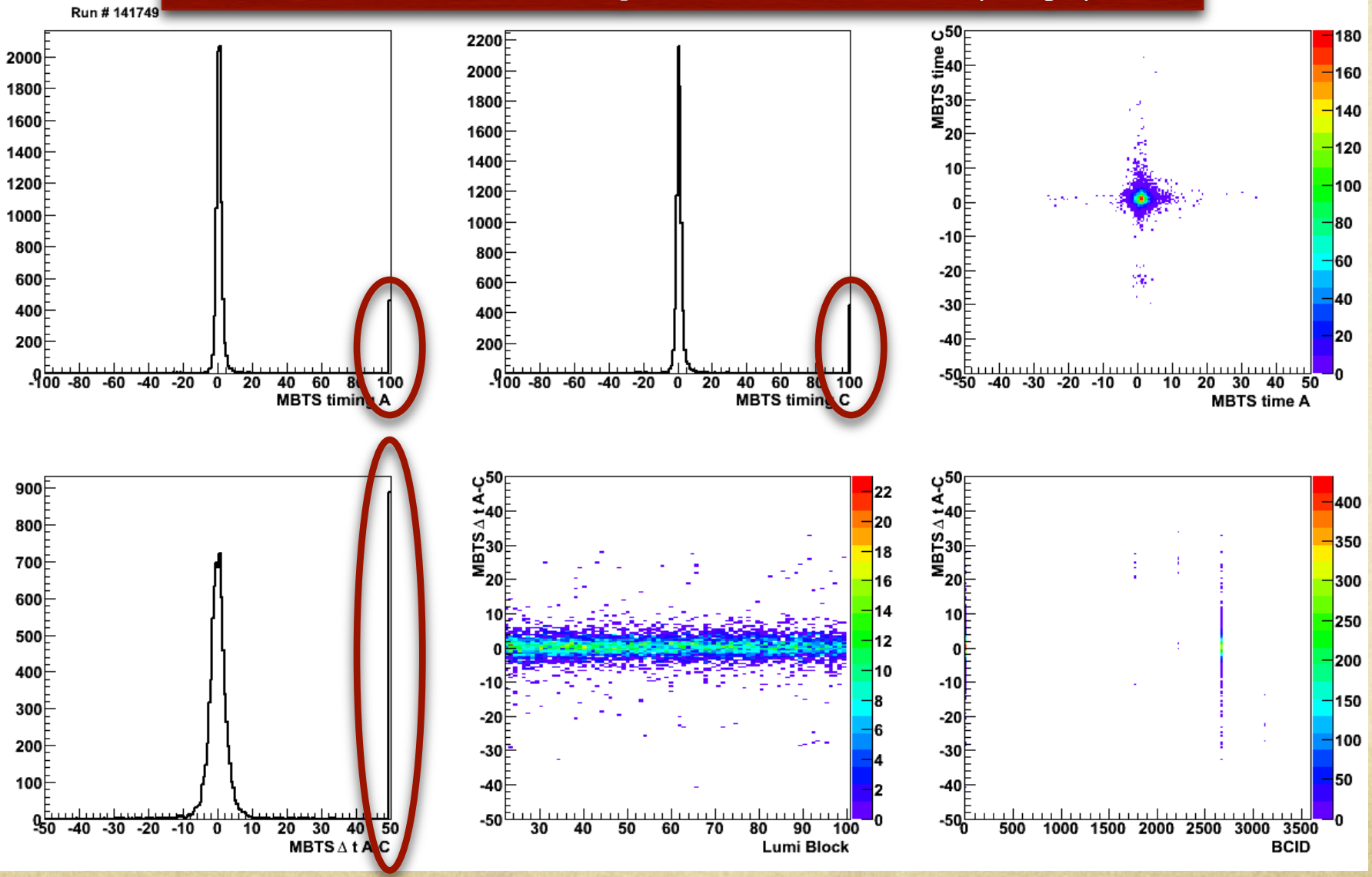
Basic Event Selection

- Correct Lumi Block Range
  - 22-101 for run 141749
  - 126-165 for run 141811
- >=1 track per event: Very loose track selection
  - pT > 500
  - |eta| < 2.0
  - >=1 pixel hits
  - >=3 SCT hits
  - >=10 TRT hits
- No trigger for today (sorry)

No tracking Cuts

Problem... Fishy Events...

800+ events with MBTS timing > 100ns... can this really be physics???

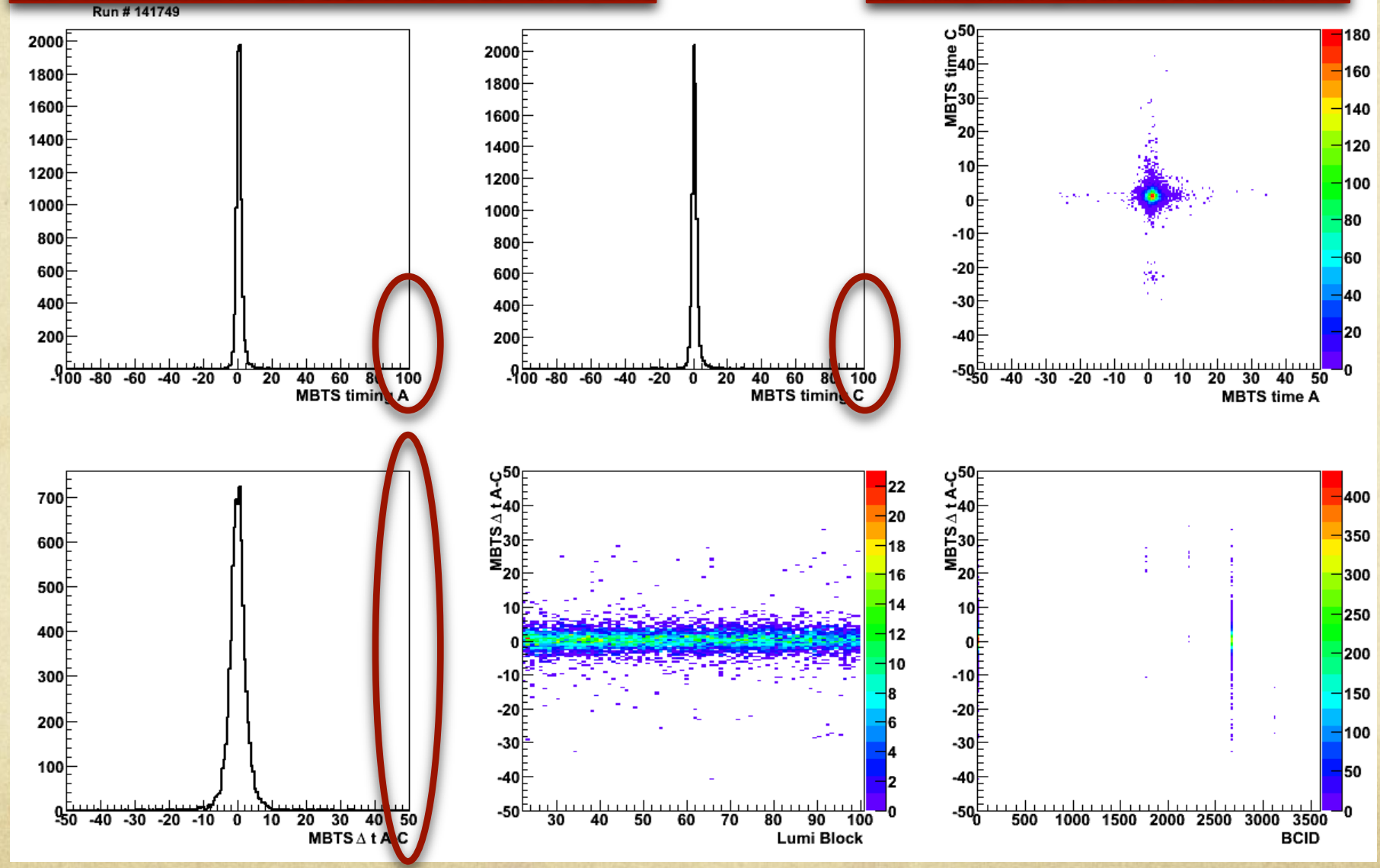


No tracking Cuts

Remove by Applying Cut

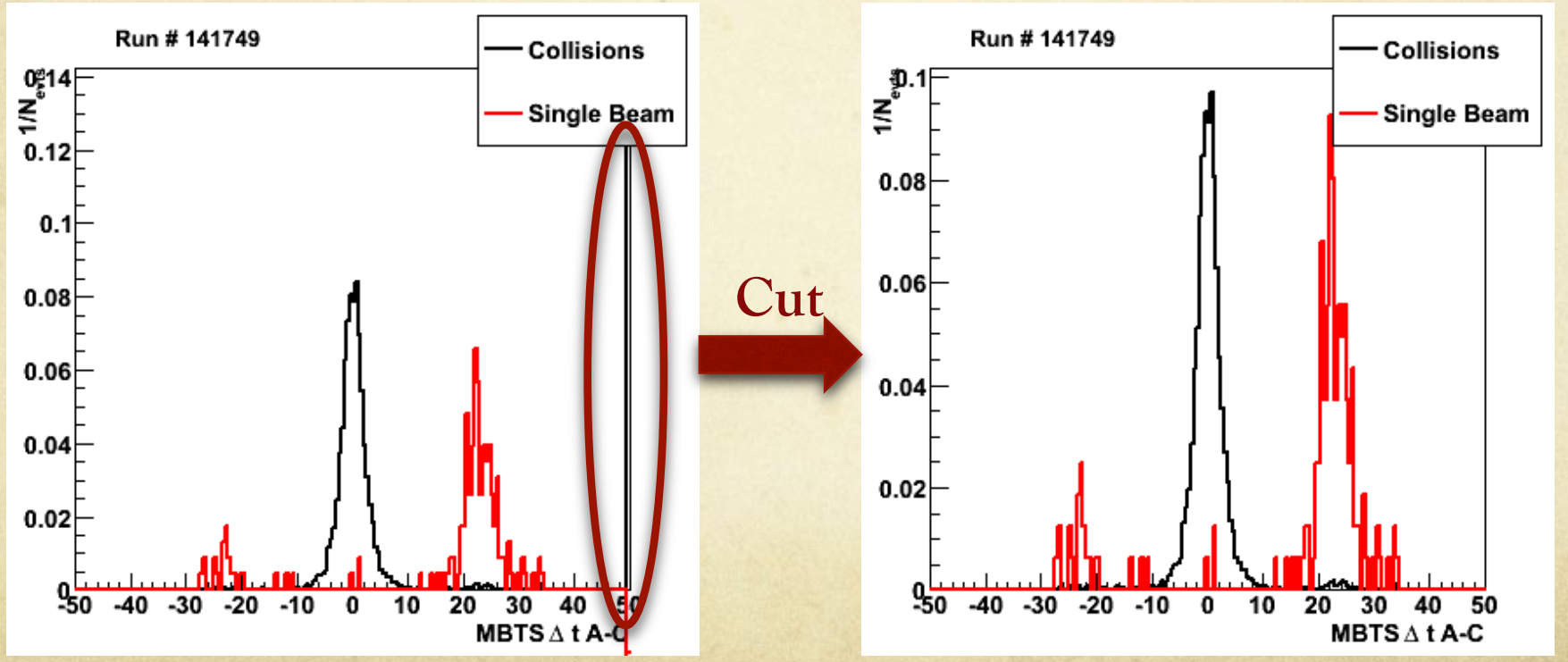
>1 hit in each side of MBTS above 0.18pC

Changes to peak are "invisible"



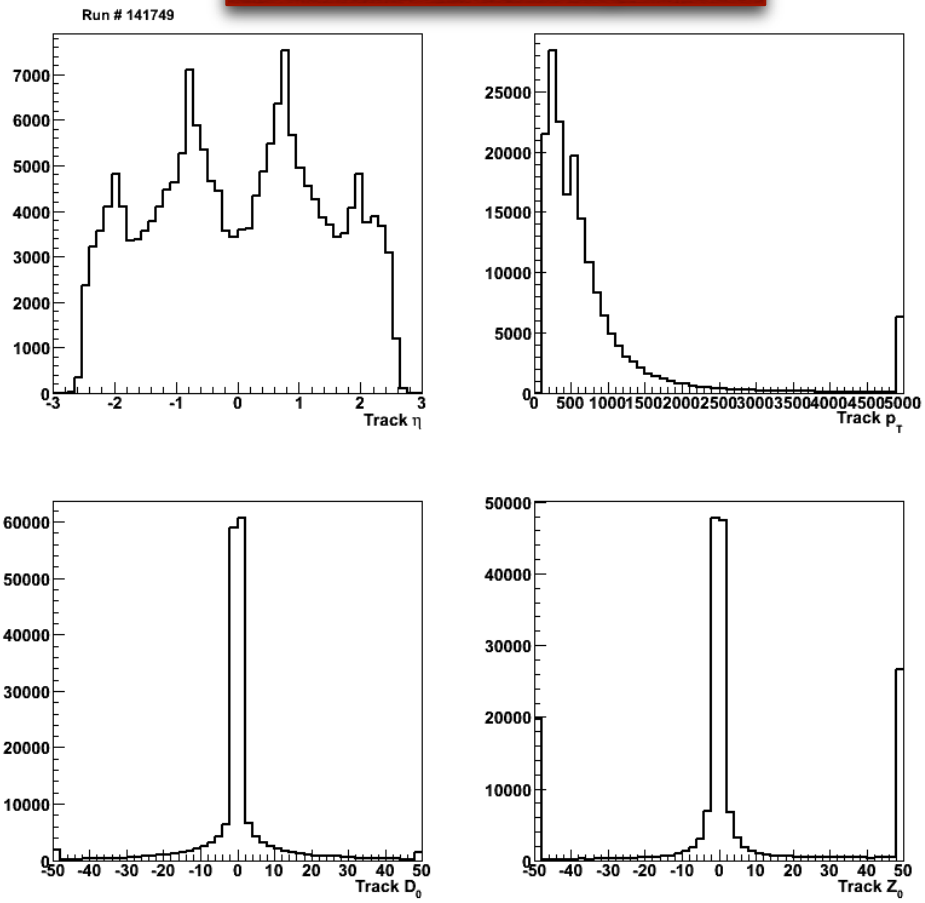
…cont…

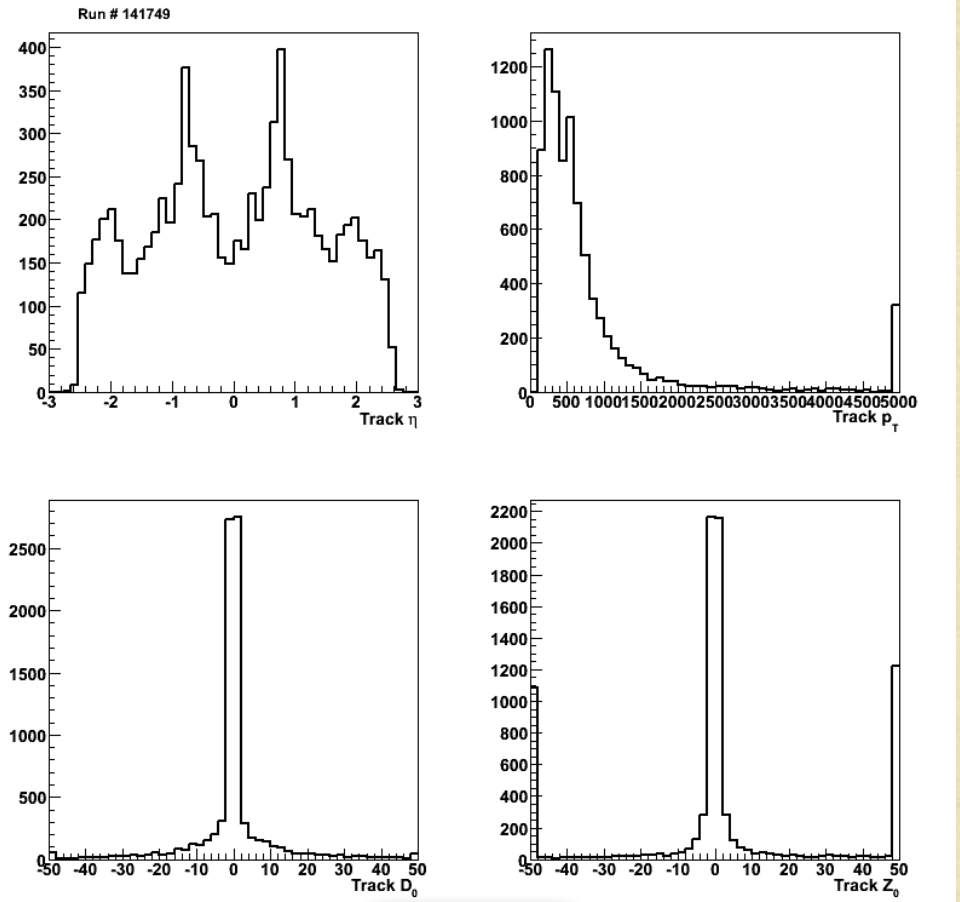
- Tried to apply track quality cuts on event to get rid of these events but nothing helped
- Would be good to further investigate if events really pathological in behaviour other than MBTS
- For now: apply this cut and be happy with clean sample



Tracking for "fishy" events

MBTS Cut on # segments





Anti-cut

Track Distributions look similar to "good" events…hum…

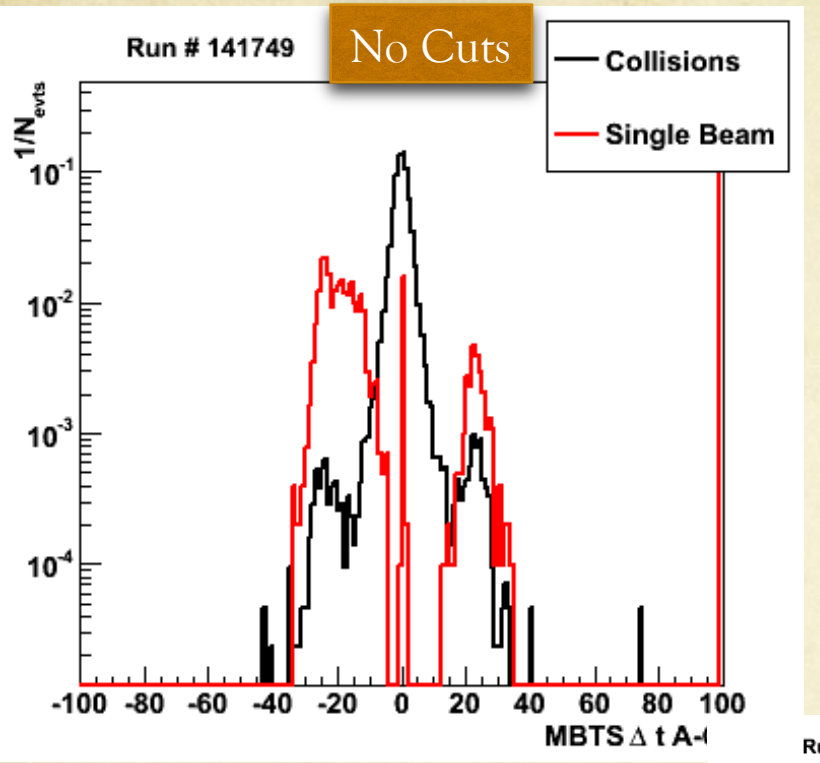
Back To beam Backgrounds... No MBTS Cut

Combining 141749 and 141811

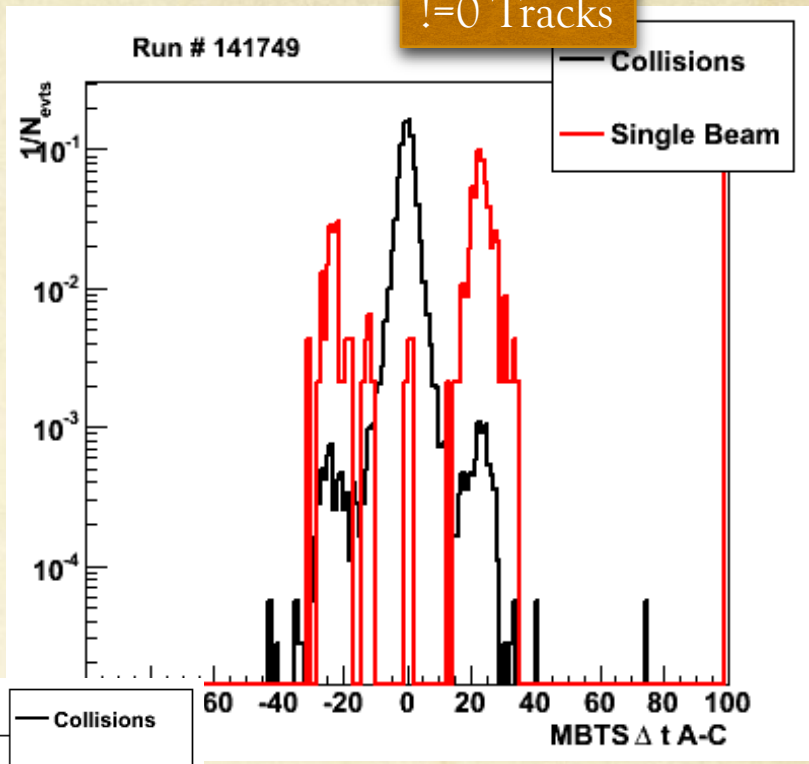
After Lumi Block selection	All	Collision BCID	Single Beam BCID
# events	52707	42564	10143
>=1 track:	36554(69%)	36087(85%)	467(5%)
>=1 GOOD track	6713(18%)	6686(18%)	27(6%)
>=1 GOOD track + >=1 vtx	6560(98%)	6557(98%)	3 (11%)

MBTS Timing

No Cuts

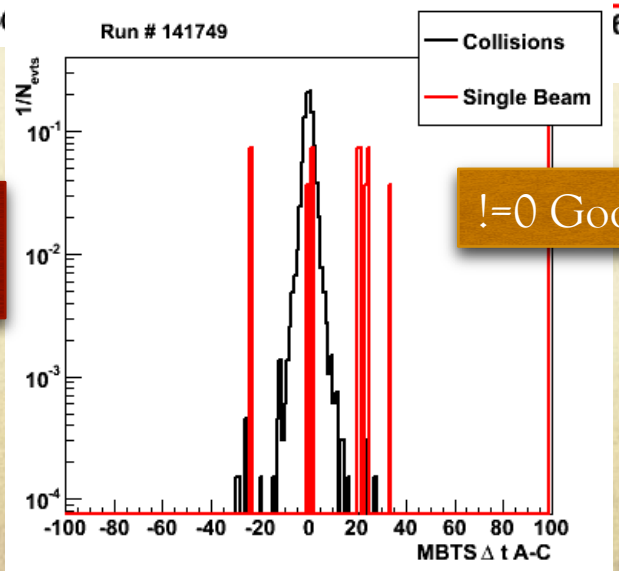


!=0 Tracks

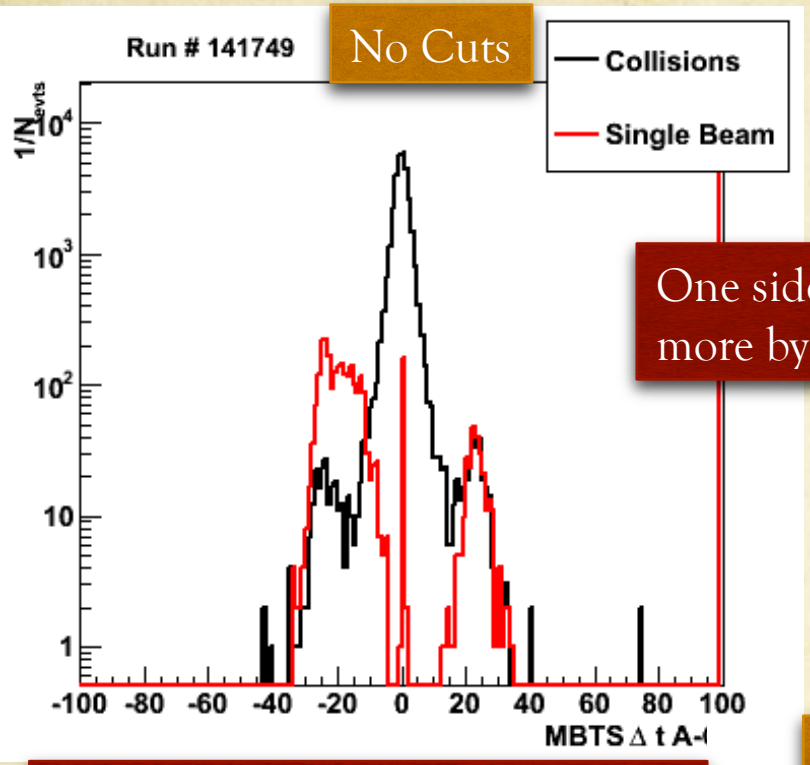


Can't say much about shape from Good tracks…

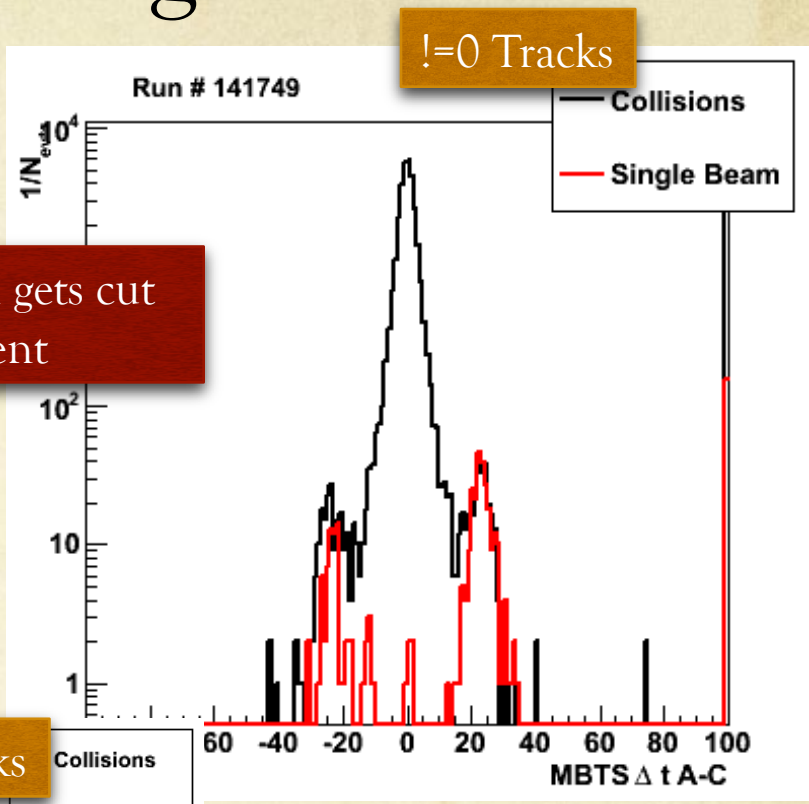
!=0 Good Tracks



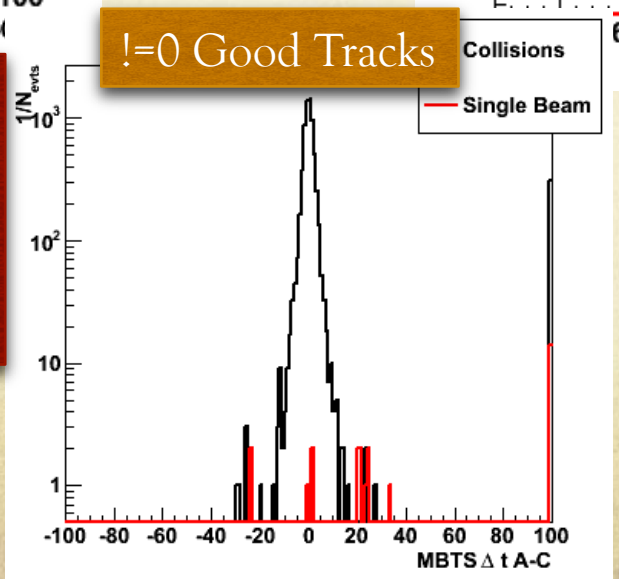
MBTS Timing



One side of background gets cut more by track requirement



Orders of magnitude by comparing side-bands:
+ side: similar number
- side: factor 10 more no cuts / ~½ of coll after track



Does NOT take into account large peak in overflow...
But as distributions look OK then assume similar behaviour

Numbers

- From Single beam data:
  - **27 events** after (very loose) good track requirement
- In collisions: expect roughly same number
  - ~27 background events
  - Total Number in correct BCID: 6686
  - **Background fraction: ~0.4%**
- Note: Need to keep an eye on why one side looks less similar between collision and single beam BCID
  - Different behaviour after basic cuts…

Conclusions

- Beam backgrounds, as estimated from non-colliding BCIDs is found to contribute less than 1% to the signal sample
- Trigger requirements might slightly change these numbers but not much
- The beam backgrounds are thus thought to be negligible for the scope of this analysis
  - Nonetheless fun to study so won't stop here ☺