

TPC Cluster-finder Plans & Thoughts

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1. We need a fully 2-dimensional cluster finder instead of the current/old 1.5-dimensional version.
 - a. The 1.5D version has known problems at large angles/rapidities
2. A 2D cluster-finder was developed called FCF2D which seems to work OK and shows the expected benefits.
 - a. but it is a bit slow
 - b. and the code is a horrible mess :-)
3. **I do not want to switch the cluster finder at this moment**, not until the BES-II run
 - a. testing any new cluster finder is a serious business because a mistake could cause a complete loss of data for the entire run (in the worst case) and I don't have time just now
 - i. and see 2b) above
 - b. the benefit of 2D is small (~5%) for the upcoming runs
 - i. and we don't need that benefit just now
 - c. the upcoming pp500 run needs all the speed it can get so slowing down DAQ is not an option
4. The natural time to switch is for the BES run due to the iTPC
 - a. we will have extended rapidity possible so the need for a robust 2D cluster-finder is important
 - b. the internal raw data formats will change significantly anyway (change of ASIC from ALTRO to SAMPA) as well as general ASIC performance
 - c. we will change the number of rows and the inner sector geometry anyway
 - d. we would like to explore the possibility of reversing the cluster-finder direction and trying to find "clusters" in the time direction instead of the padrow direction
 - e. we will have more DAQ PCs *and* the data rate is expected to be lower so we can afford a loss of speed of the cluster-finder
5. However, we should do an actual, online, real-time test of at least the current flavor of the 2D cluster finder now so that we can get a sense of gotchas as early as possible instead of waiting for the actual BES run
 - a. We plan to ask for a **special** few-million events run using the FCF2D code **as-is** around end March, early April
6. I already started (slowly) working on a new software framework for the future 2D cluster-finder
 - a. cleaner, simpler, well documented stages
 - b. possibility to trivially and cleanly change the number of padrows
 - c. possibility to simply invert the direction from padrow to timebin
 - i. and be able to run it in parallel, at the same time, with the padrow version (a good point by Yuri!)
 - d. clean & simple approach to gain & T0 corrections
 - e. tighter (meaning faster) integration of the raw data decoding and the input stage of the cluster-finder
 - i. this is important for the speed!
 - f. can handle ALTRO or SAMPA input (or anything else such as simulated data) in a simple way
 - g. faster algorithms in the 2D case (instead of the brute force I have now)
 - h. however, I will not change the conceptual algorithms of the 2D cluster-finder but just the actual software code
7. The first working version of the new framework I expect end of 2017.
 - a. At which point we need the Reconstruction group to test all the features

