Improvement in DT Segments reconstruction

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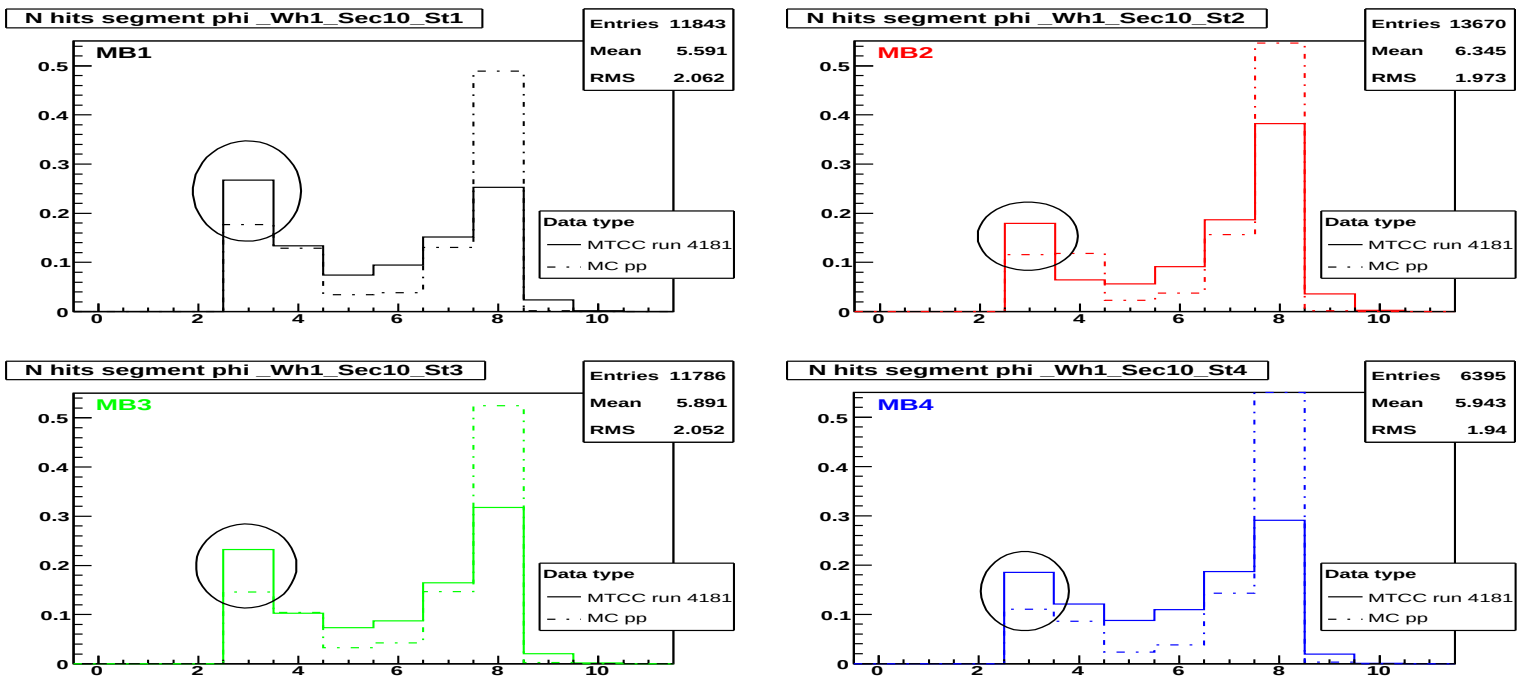
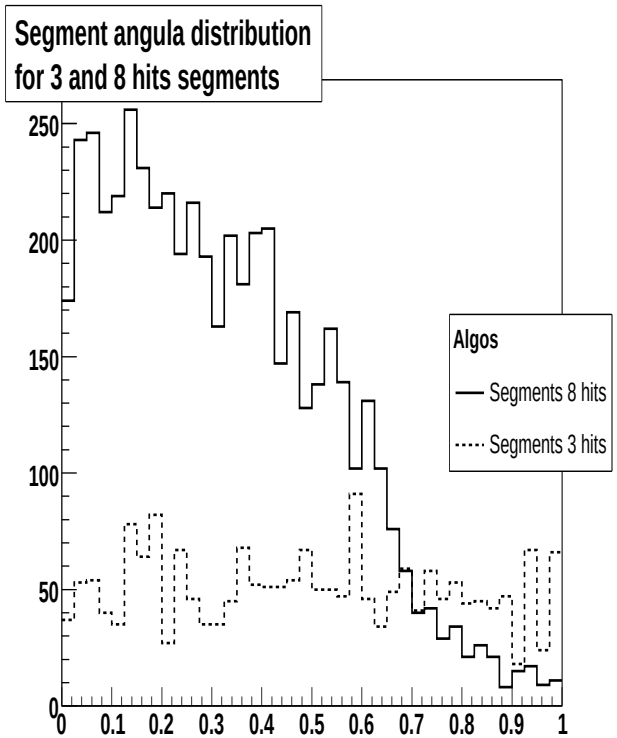
The problem

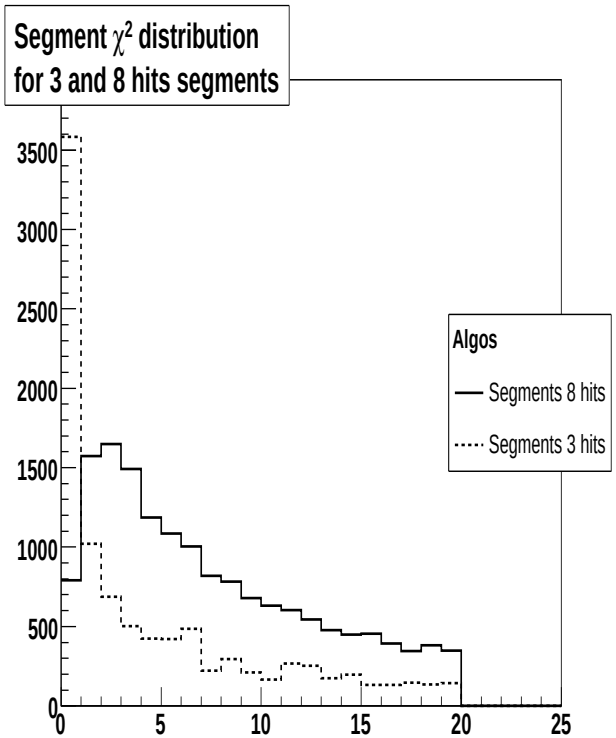
- Hits multiplicity in DT segments in MTCC events show an excess of three hits segments

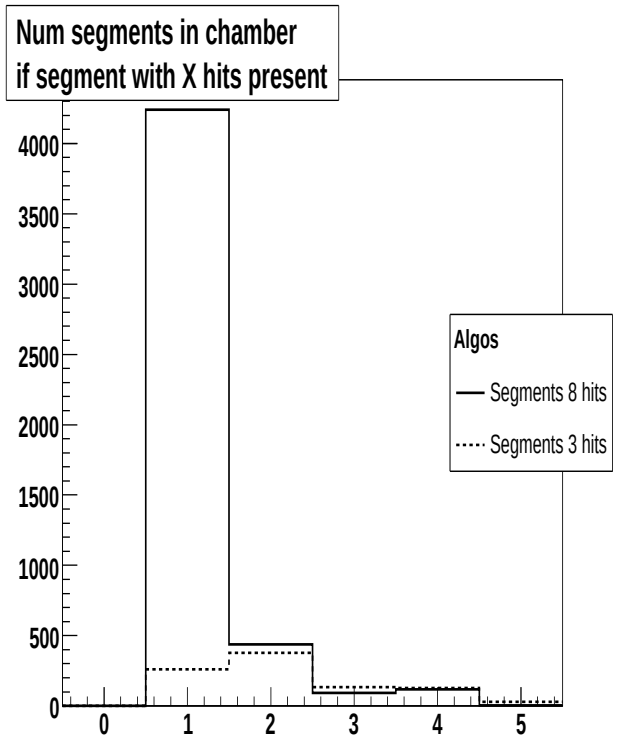


- Shown here compared with MC pp simulation
- Most of them are not real, but comes from uncorrect pattern recognition

- Angular distribution flat
- χ^2 peakad at low values
- typically other segments in chamber





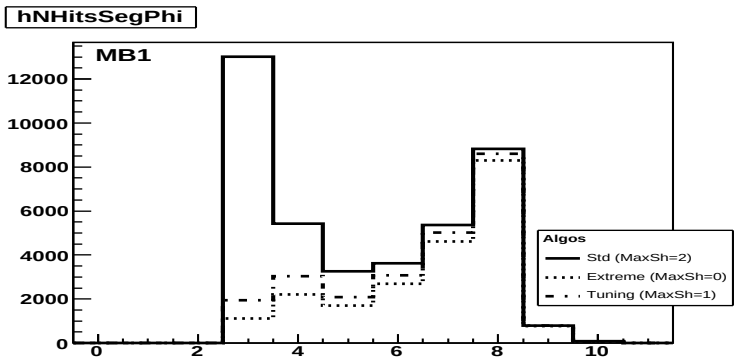


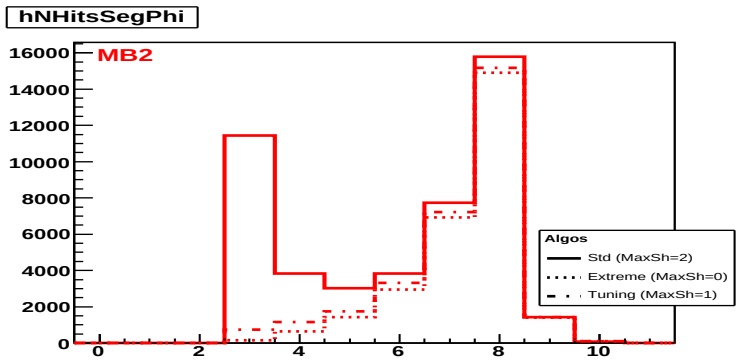
Current algo

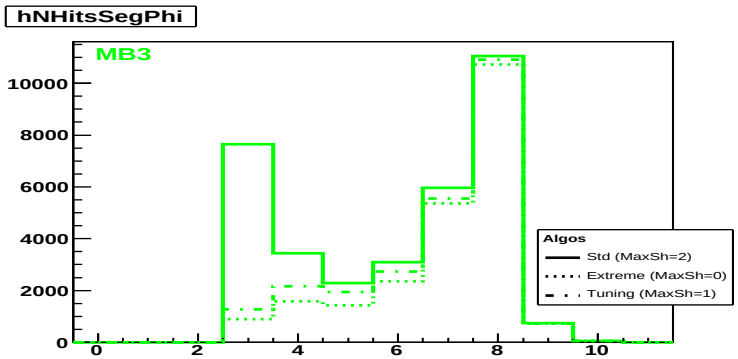
- It's rather easy for three hits to be more or less aligned, especially if the intrinsic hit resoltion used for pattern recongition is big (as is the case today)
- Pattern recognition which accept shared hits allows more of these short segments to be found
- Current algo allows for two shared hits between two segments
  - it is possible that a 3 hits segments has 2 hits shared with a longer segment unlikely a true one.

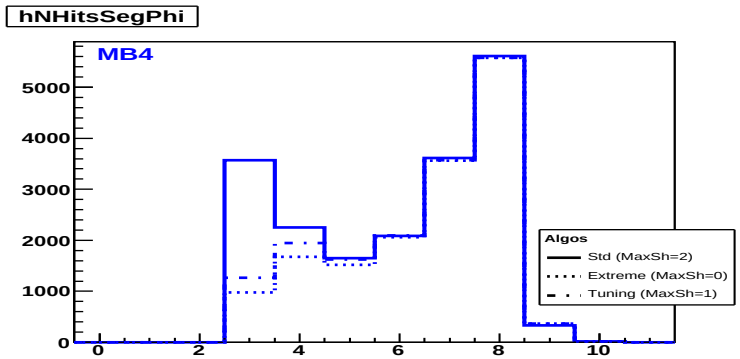
Possible tuning

Reducing to 1 or 0 the number of shared hits kills these fake segments, but also longer (higher multiplicity) ones.





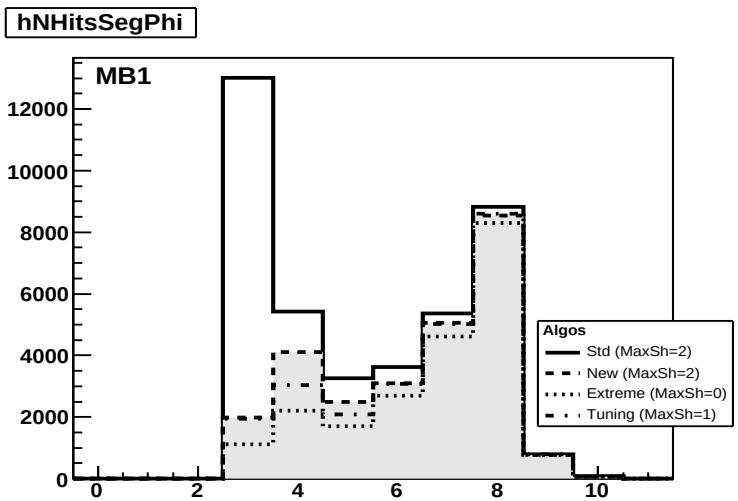


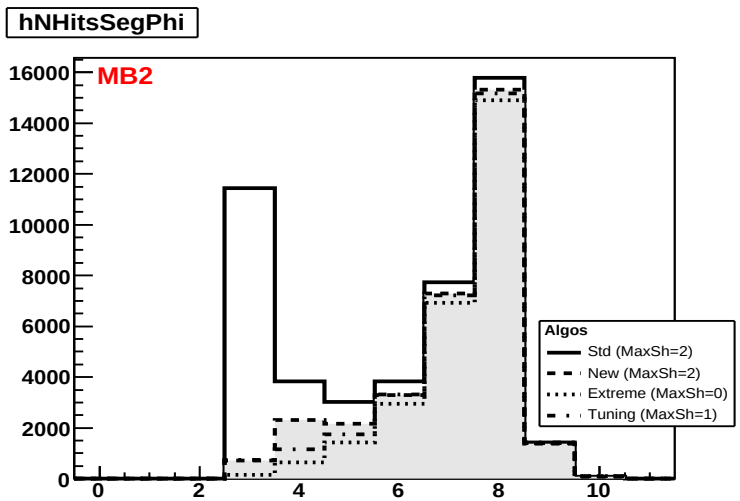


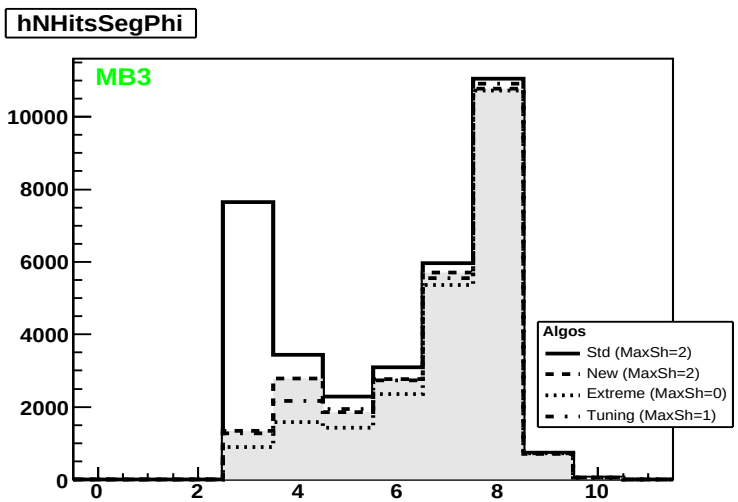
Better result if require that any segment must have at least 2 unshared hits

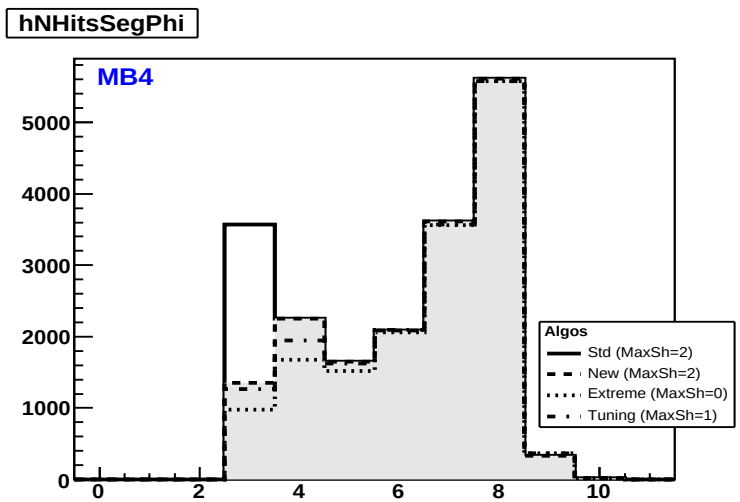
Results

MTCC Run 4181 (DT trigger with $B = 4$ T)



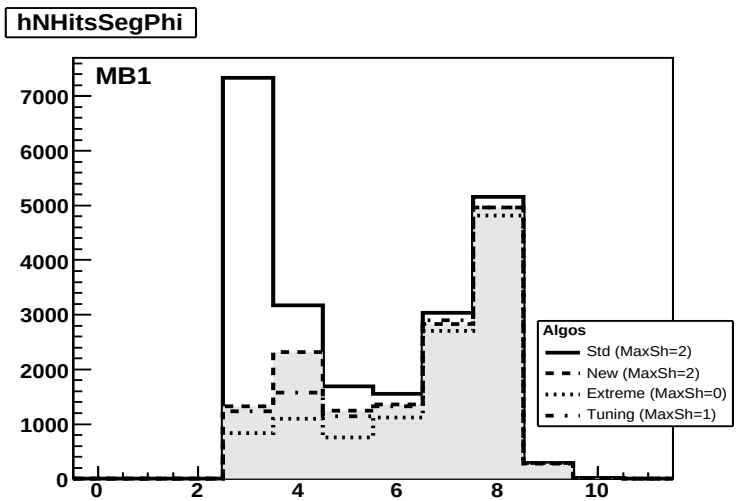


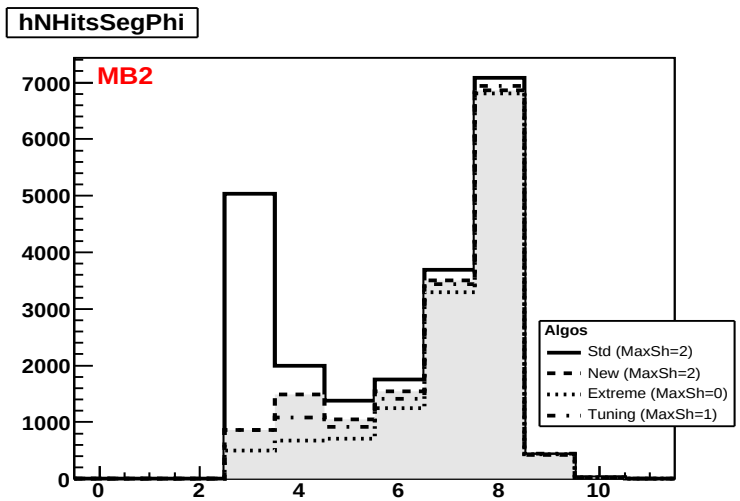


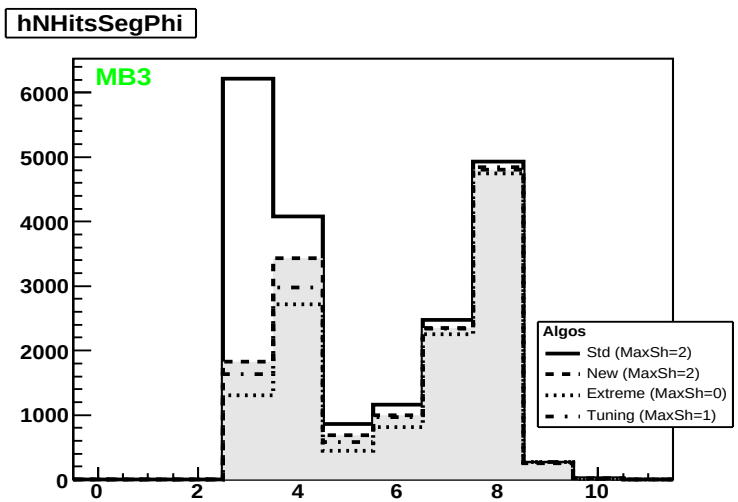


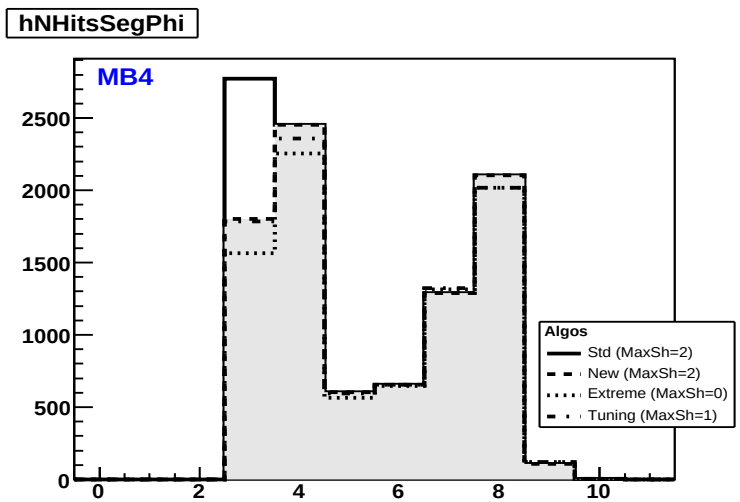
Results

MTCC Run 4333 (RPC trigger with $B = 0$ T)



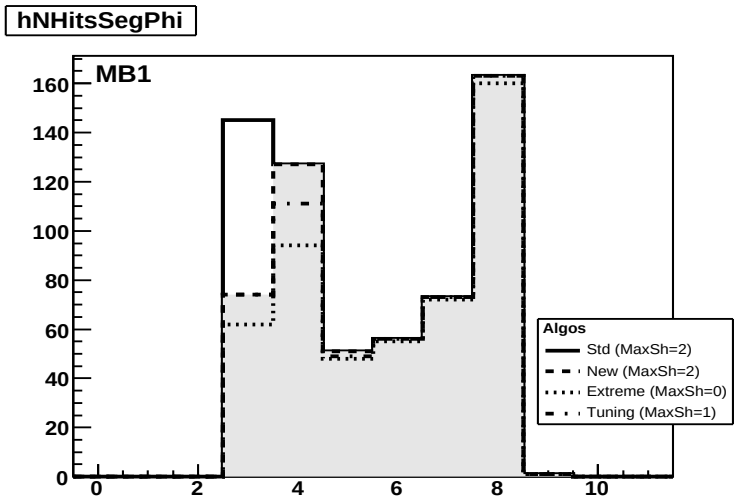


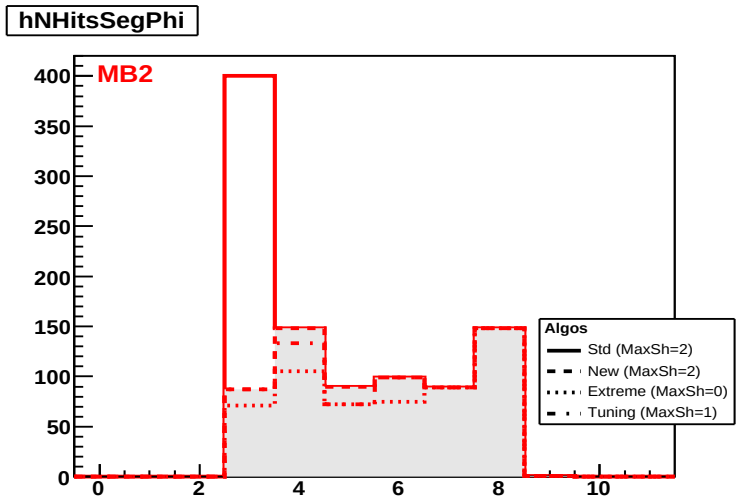


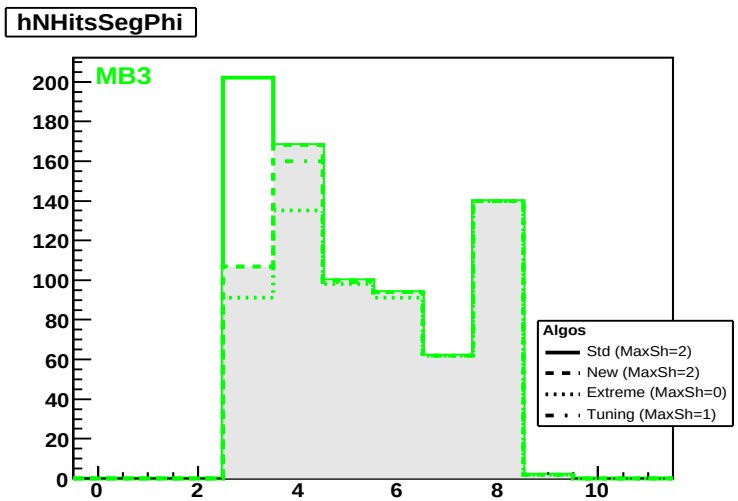


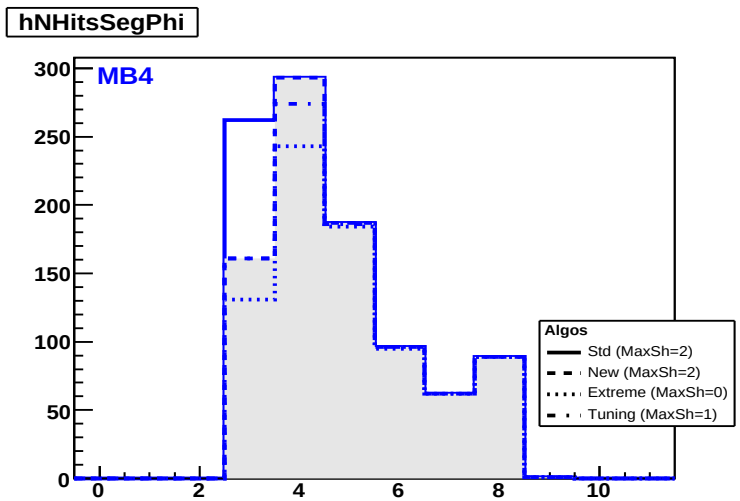
Results

MTCC MC (few events...)



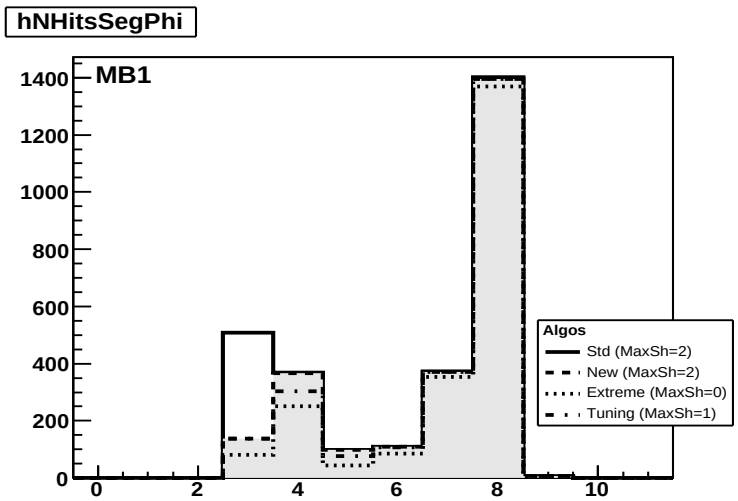


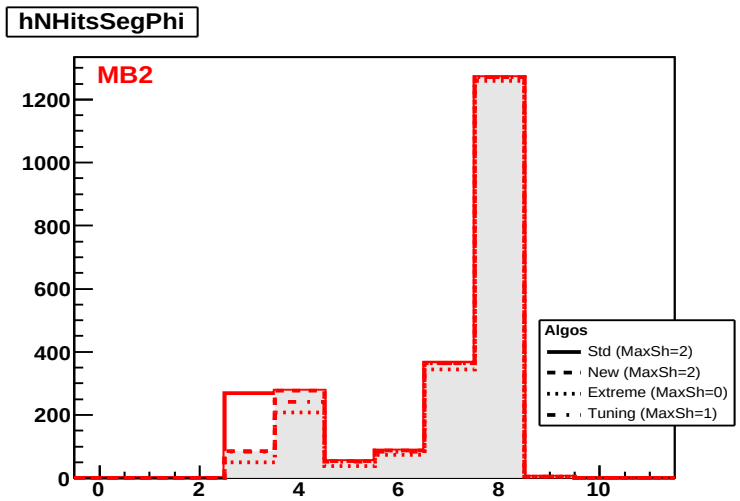


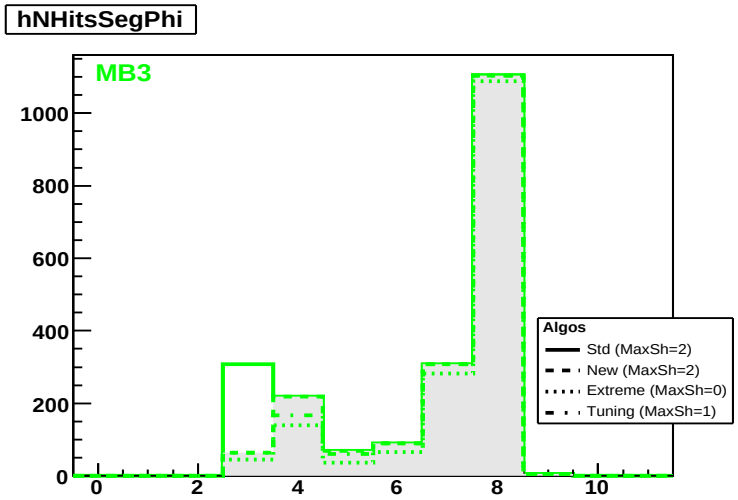


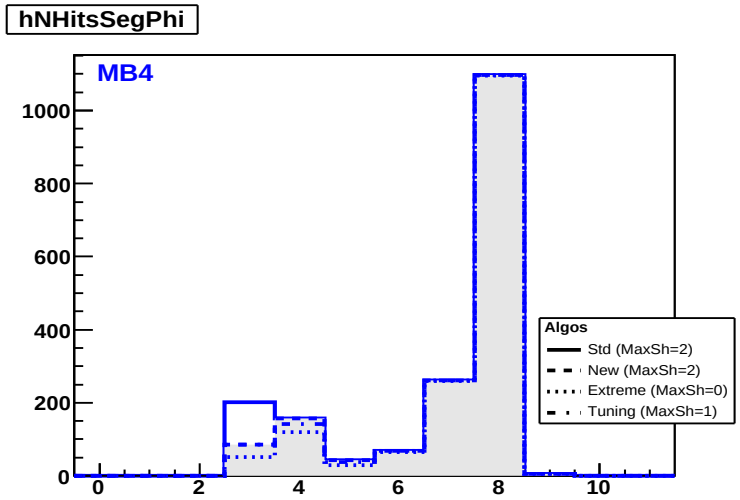
Results

MC Single Muons from IP







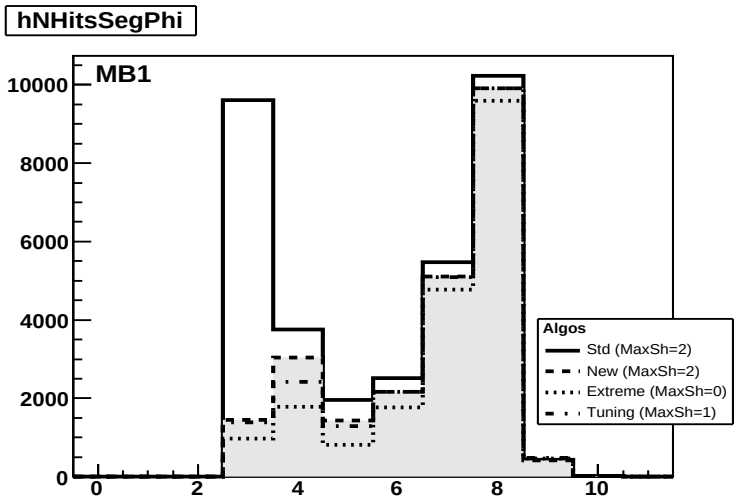


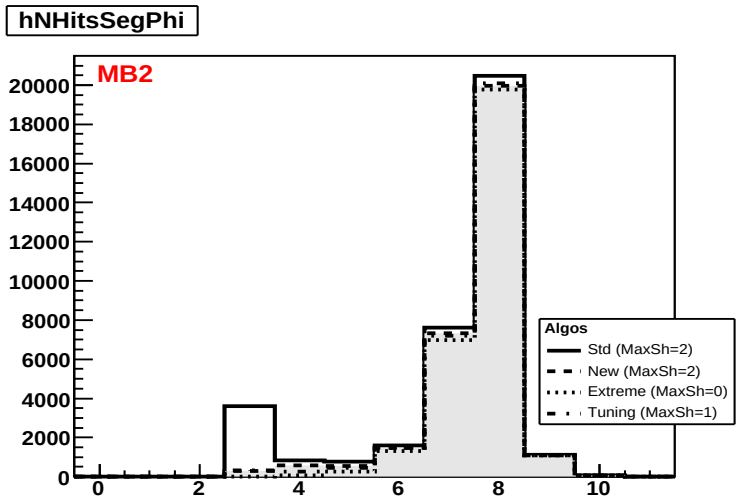
Conclusion

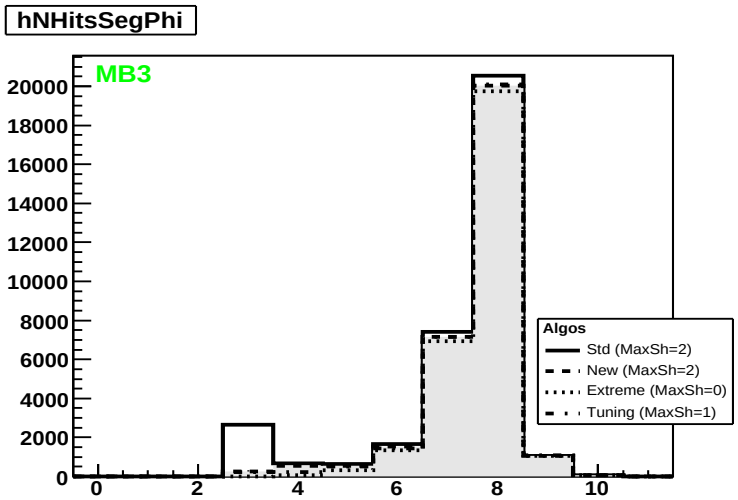
- Many short, fake segments present in DT chamber local reconstruction can be killed by applying a slightly improved algorithm
- Ghost suppression based on requirement that if two segments have shared hits, they must have at least 2 unshared hits gives best results
- Code ready to be committed and used by anyone.

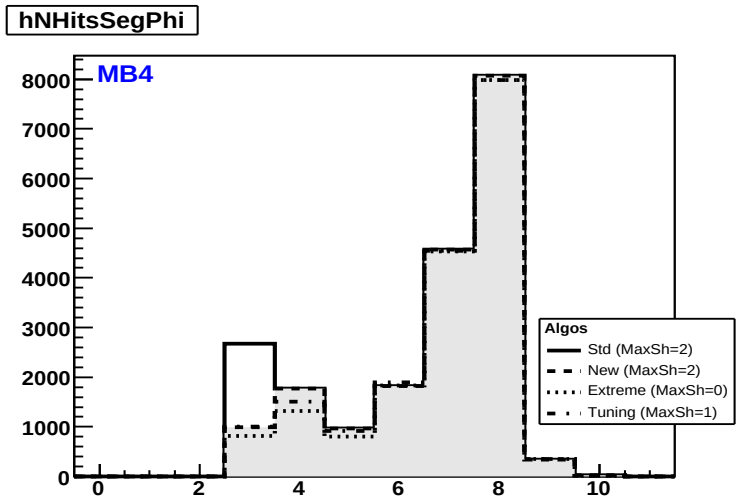
Results

MTCC Run 4446 (DT trigger with $B = 0$ T)









Results

MTCC Run 4398 (RPC trigger with $B = 0$ T)