Recent progress and update on new activities

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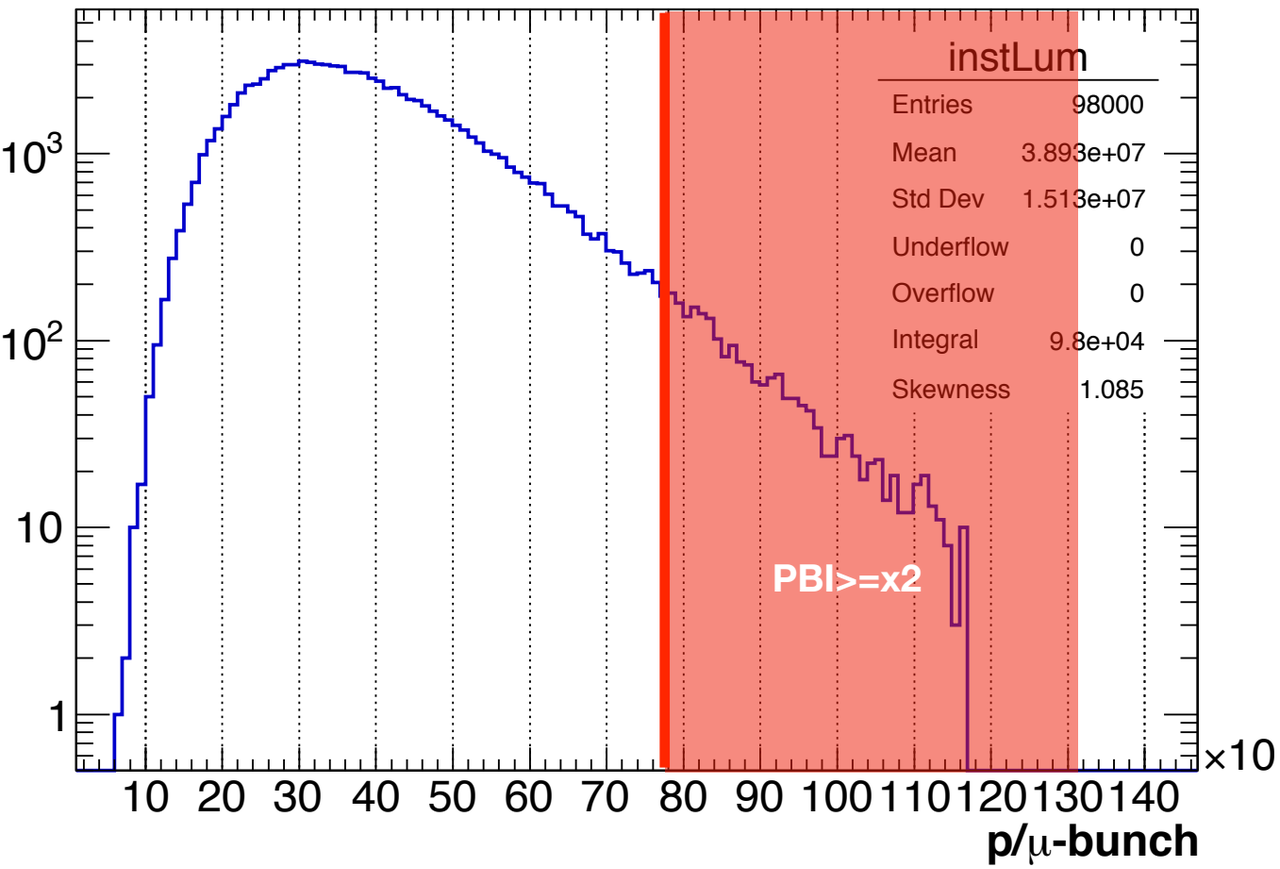
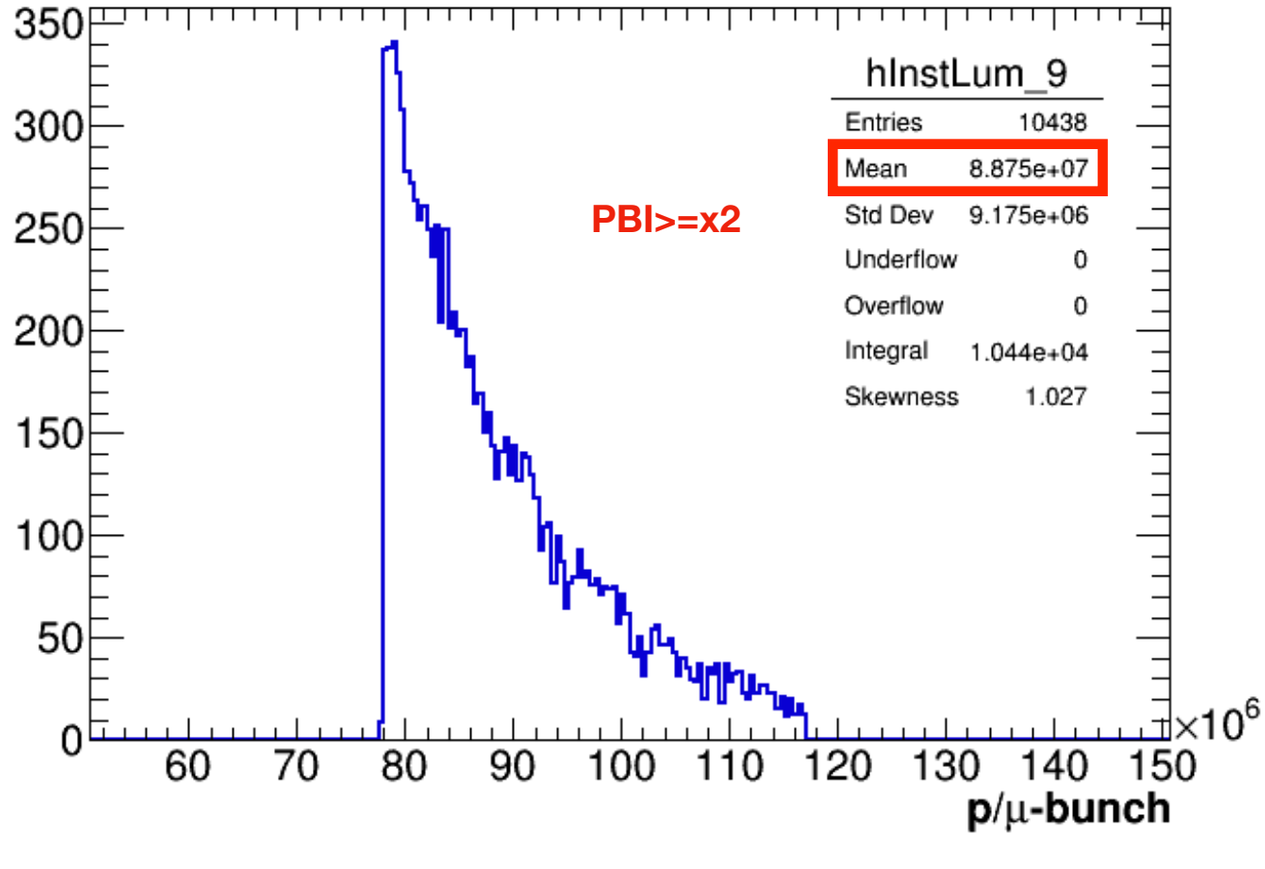
μ-bunch intensity filter

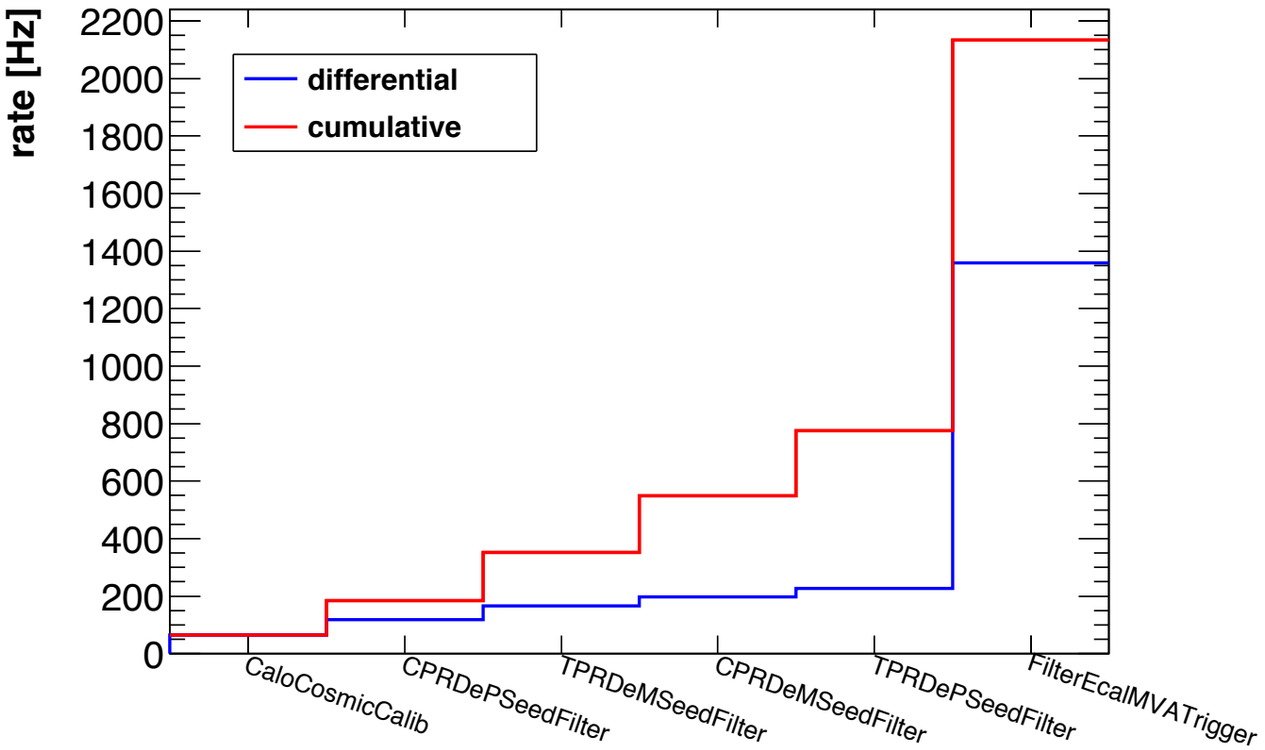
- Skimmed 2 datasets: PBI>=x2, PBI >=x3 using the 500k evts dataset
- average PBI ~ x2.27

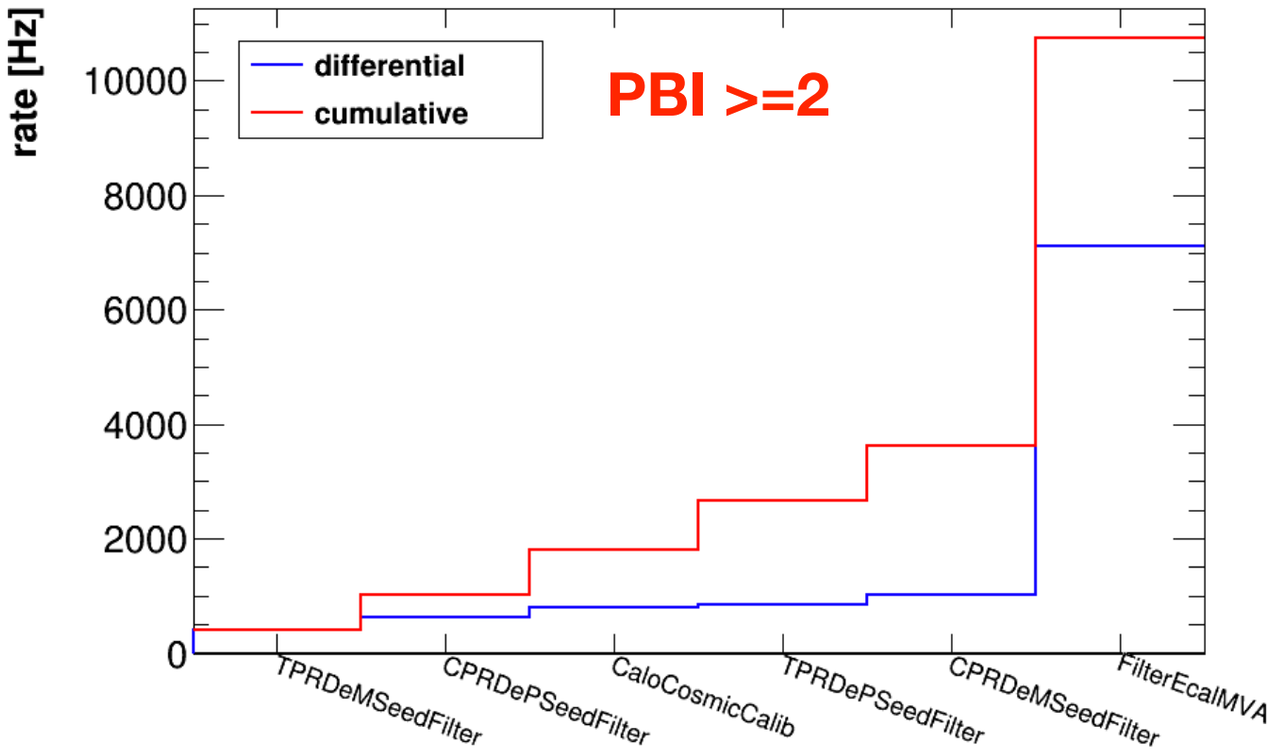




Trigger rate

- Distribution of the instantaneous rate: nominal vs PBI>=2
- For the trigger rates increases by a factor ~5





DAQ architecture

- how to do we expect the DAQ server will handle the larger time/event needed in the cycles with largest intensity?
  - How large the memory on the DTS should be?
- ROC/V-TRX limitations in this situation?
  - need to update estimates of the expected bandwidth

- Yesterday at the TDAQ meeting we decided that 2 docs will discuss mitigation strategies and required test to be done in the near future

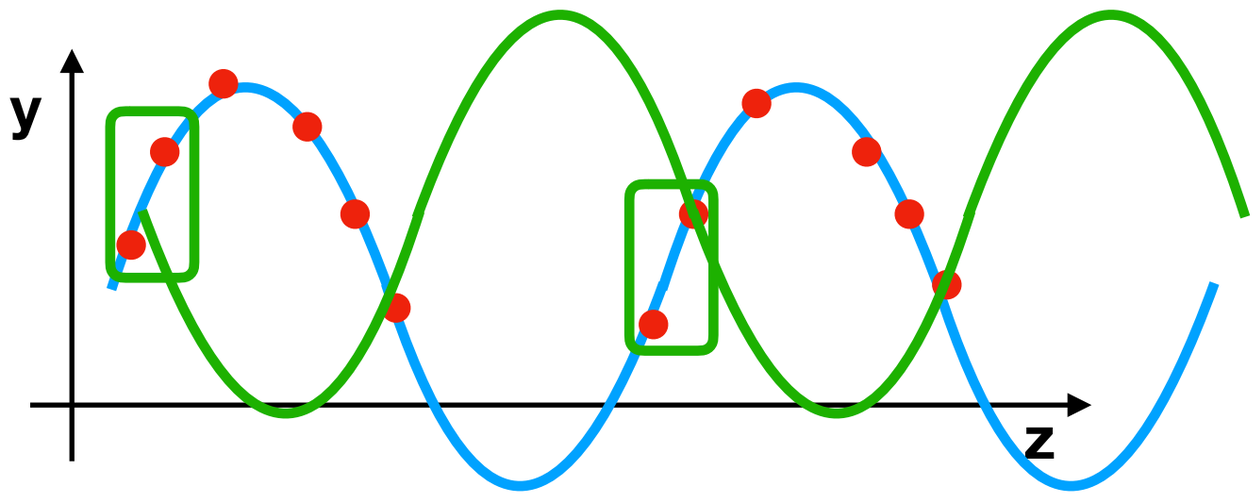
Rejection improvements

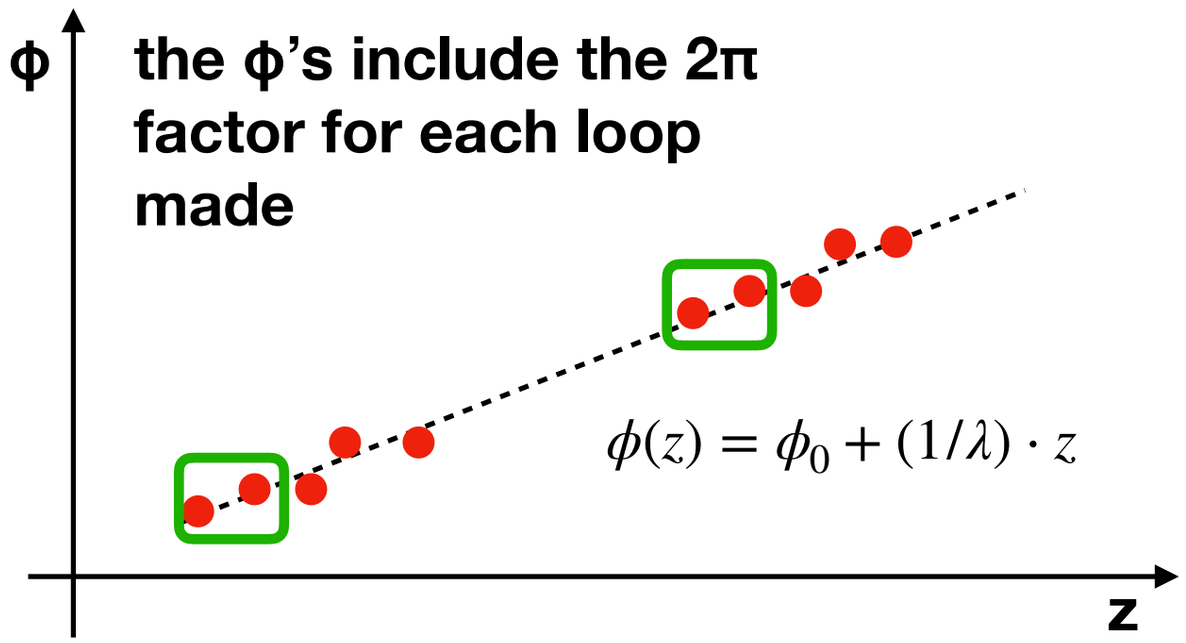
- Claire code committed - x2 improvements in the rejection of the calo-seeded tracking trigger
- Now she will be inspecting the events lost (very few) and study the topology of those background events we are still triggering

- Next step: perform the two pattern reco steps (DeM and DeP) at the same time to suppress the probability of charge mis-identification

Still room for improvements

- The calo-seeded alg unfortunately when testing the wrong helicity, could match point that are 2π away from each other
- In this way, you find an fake helices that contains a subgroup of the hits clustered by the helix found with the correct helicity





Rejection improvements 2

- Michael observed that in several background triggered events (by the tracker-only alg) the typical topology was:

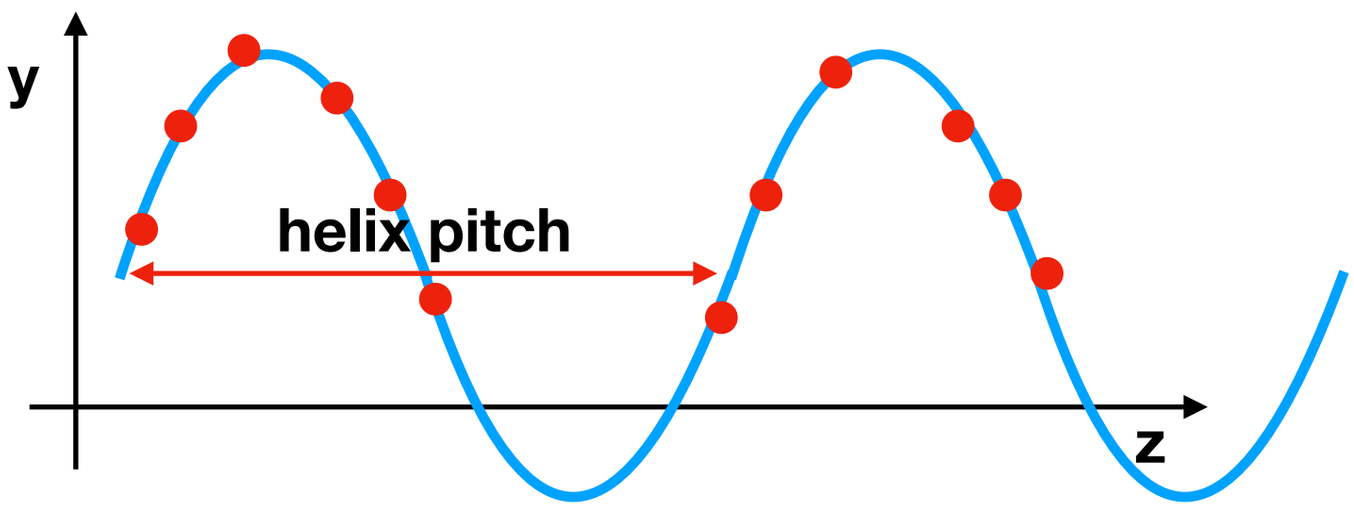
  ➡ an almost correct pT

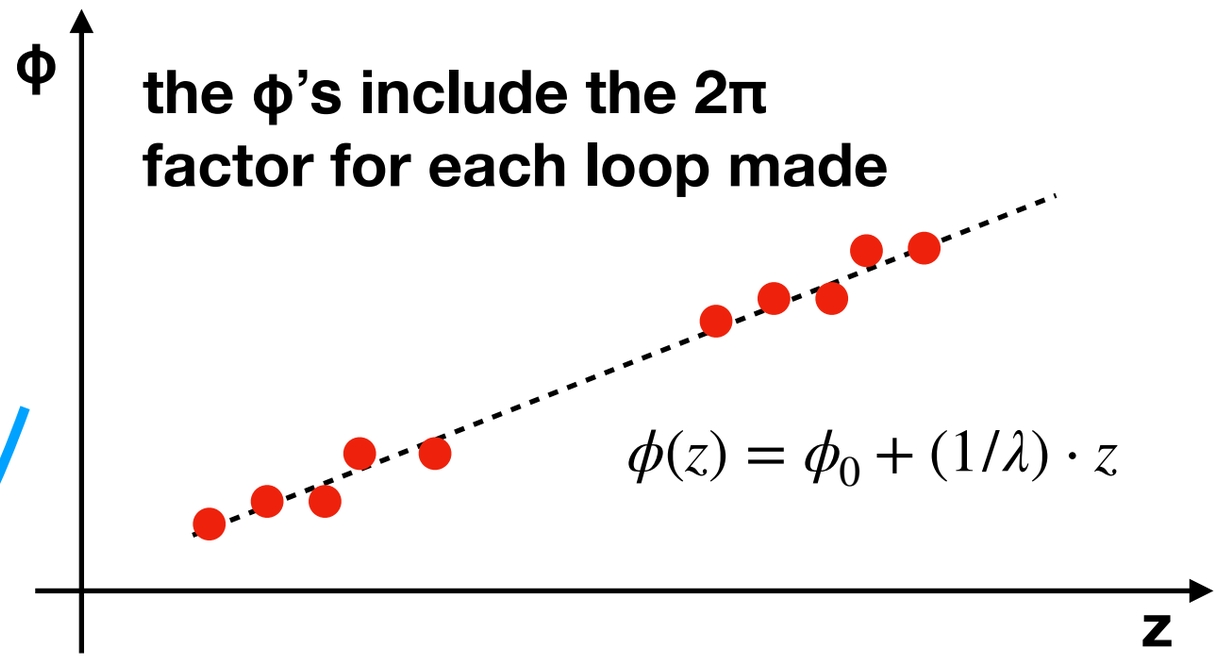
  ➡ a completely overestimated p

- So we inspected the part of the algorithm that evaluates the helix pitch angle

how we evaluate λ

- **Tracker-only**: create an histogram of all the dz/dϕ values obtained from of the possible pairs of point within a given range [dz_{min}, dz_{max}]
- **Calo-seeded**: it starts by doing the same as the tracker-only, then it performs a fit to a line on the ϕ-z plane using the least square method



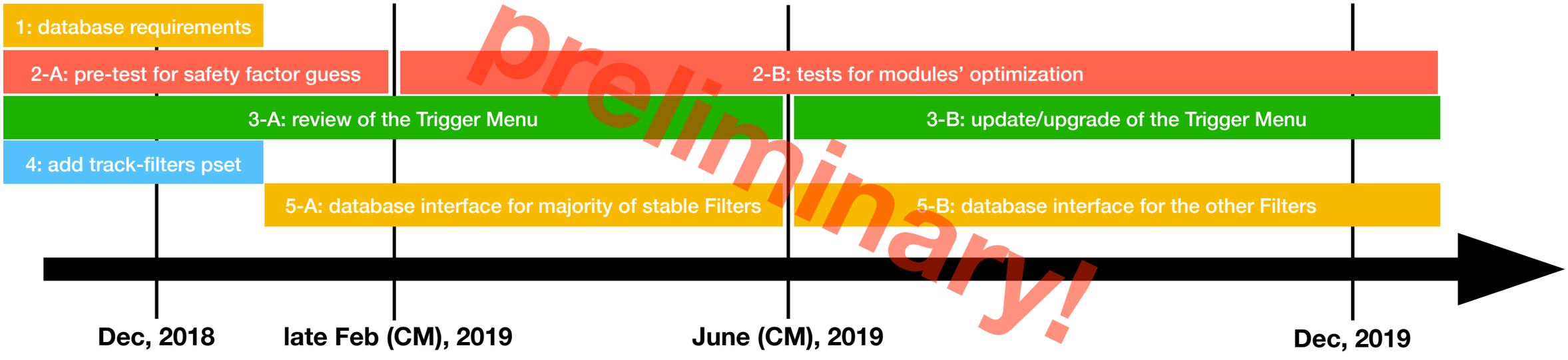


observations

- **During the histogram-creation step**, it is extremely relevant to not pair strawHits from different loops, because in this step there is no resolution of the 2π ambiguity
- So the choice of dz_{max} may bias mis-reconstruction of the λ and thus the p_z!
- In principle, $dz_{max} = p_{z-min} \cdot \frac{10}{3}\frac{1}{B} \cdot 2\pi$

Time line

1. define a clear set of requirements for the database
2. timing tests on *artDAQ* to:
   - define safety factors
   - optimize reco modules
3. Trigger Menu:
   - review: (I) motivation, (II) performance study
   - update/upgrade phase: new filters
4. include "stable" Filters pset in the script config files
5. implement database interface: A. stable filters, B. others



Time line

- for the next CM (end of February) I think we should write:
  - ➡ short notes for each trigger performance
  - ➡ one doc describing the current Trigger Menu