Combining HW+TB endcap alignment

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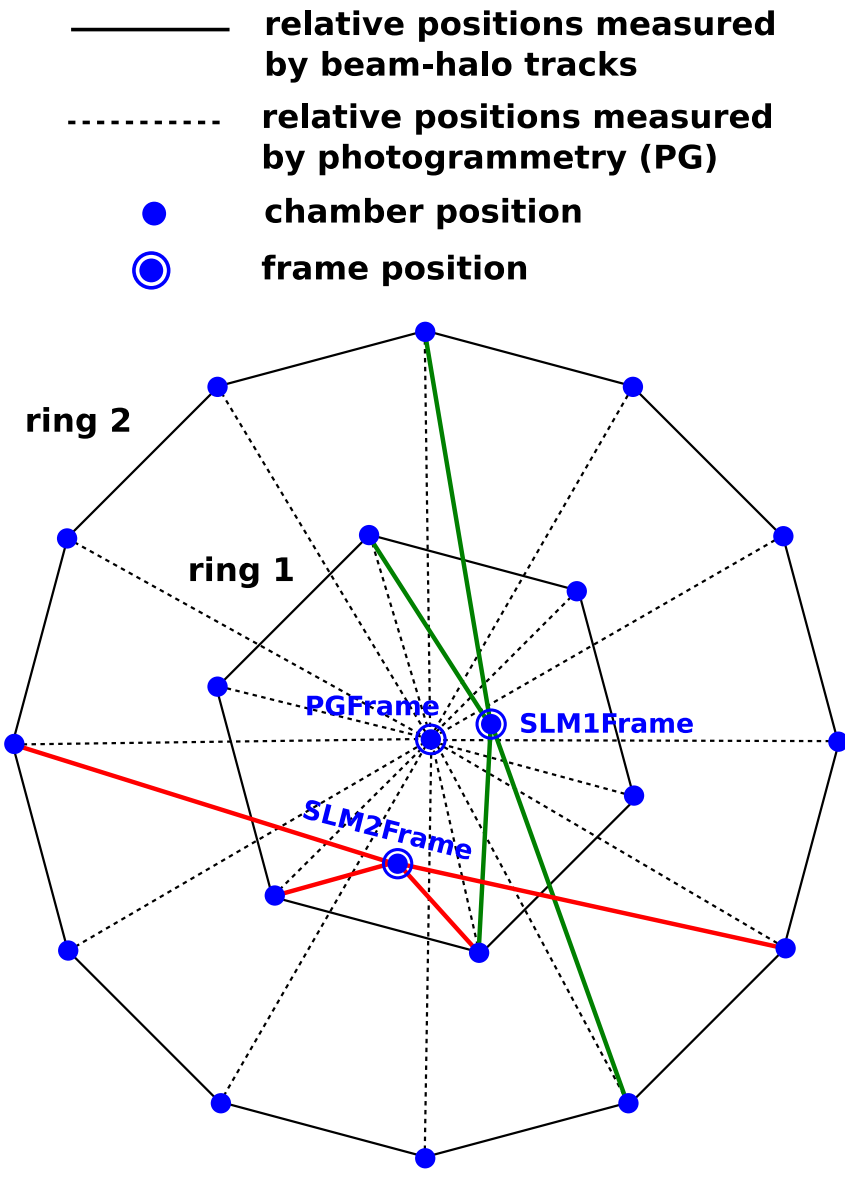
General idea

- Track-based CSC alignment module optimizes alignment given a set of measurements (positions with independent uncertainties)
- Some of these are derived from track residuals; others may be introduced by hand (e.g. photogrammetry)
- Only requirement is that there must be enough measurements that the graph is fully connected (no islands)
- Adding DCOPS: we would add 3 new floating coordinate frames connected to the monitored chambers

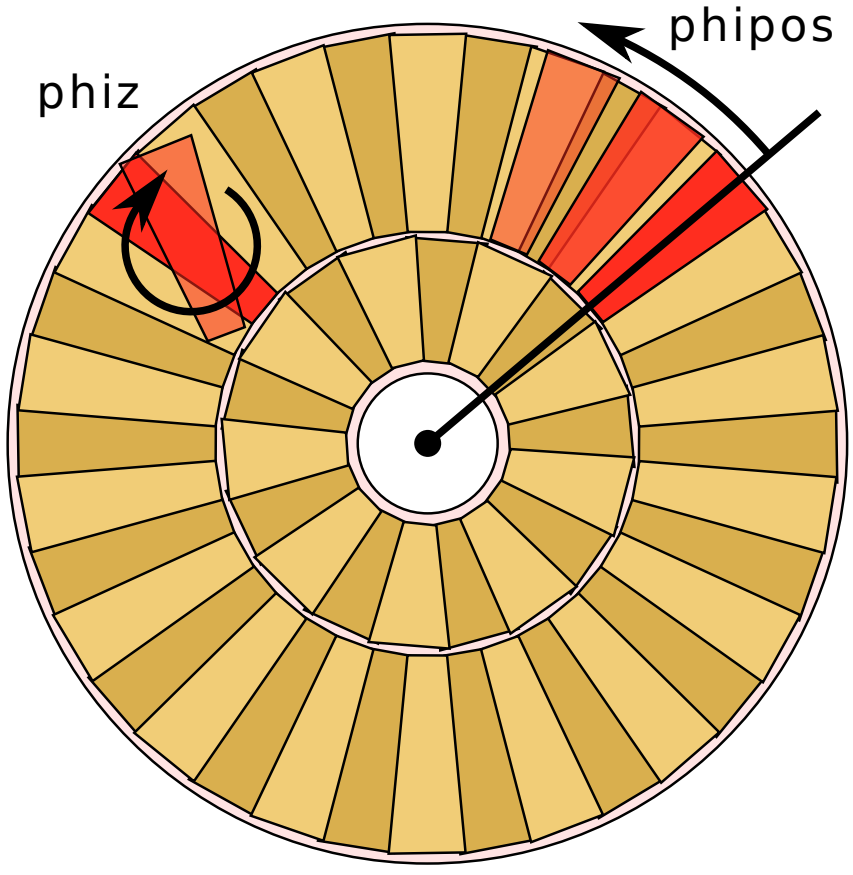


Technical details

- Adding measurement "lines" to the graph: this is in the CMSSW configuration file— I would do it
- Providing measurements:
  - two simple-format text files: see Alignment/MuonAlignmentAlgorithms/data/Photogrammetry2007.*

    ```
    ME+1/2/01 -3.9173832602512e-05 5.73795e-05
    ME+1/2/02 0.174428948607051 5.73795e-05
    ME+1/2/03 0.348821455510375 5.73795e-05
    ...
    ```

  - "phipos" file: $\phi = \text{atan2}(Y, X)$ position and uncertainty of each monitored chamber in disk coordinates (radians)
  - "phiz" file: ϕ_z angle and uncertainty of each monitored chamber (radians)
- Automated machinery takes over from there
- We can check consistency via the alignment fit residuals, but it's worth checking against the Photogrammetry2007.* files to make sure that we're using the same conventions



Absolute positions (not relative to ideal) in disk coordinates