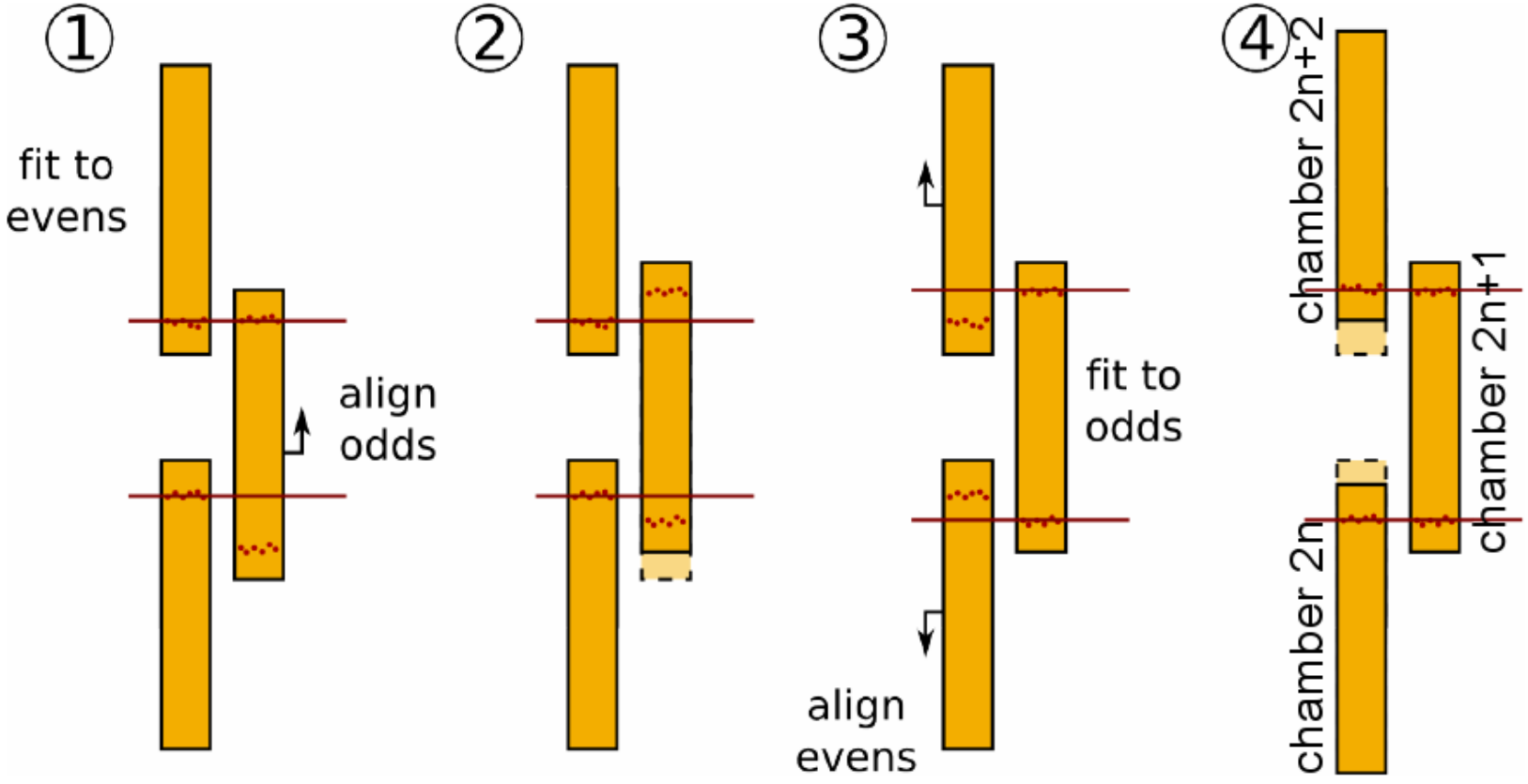
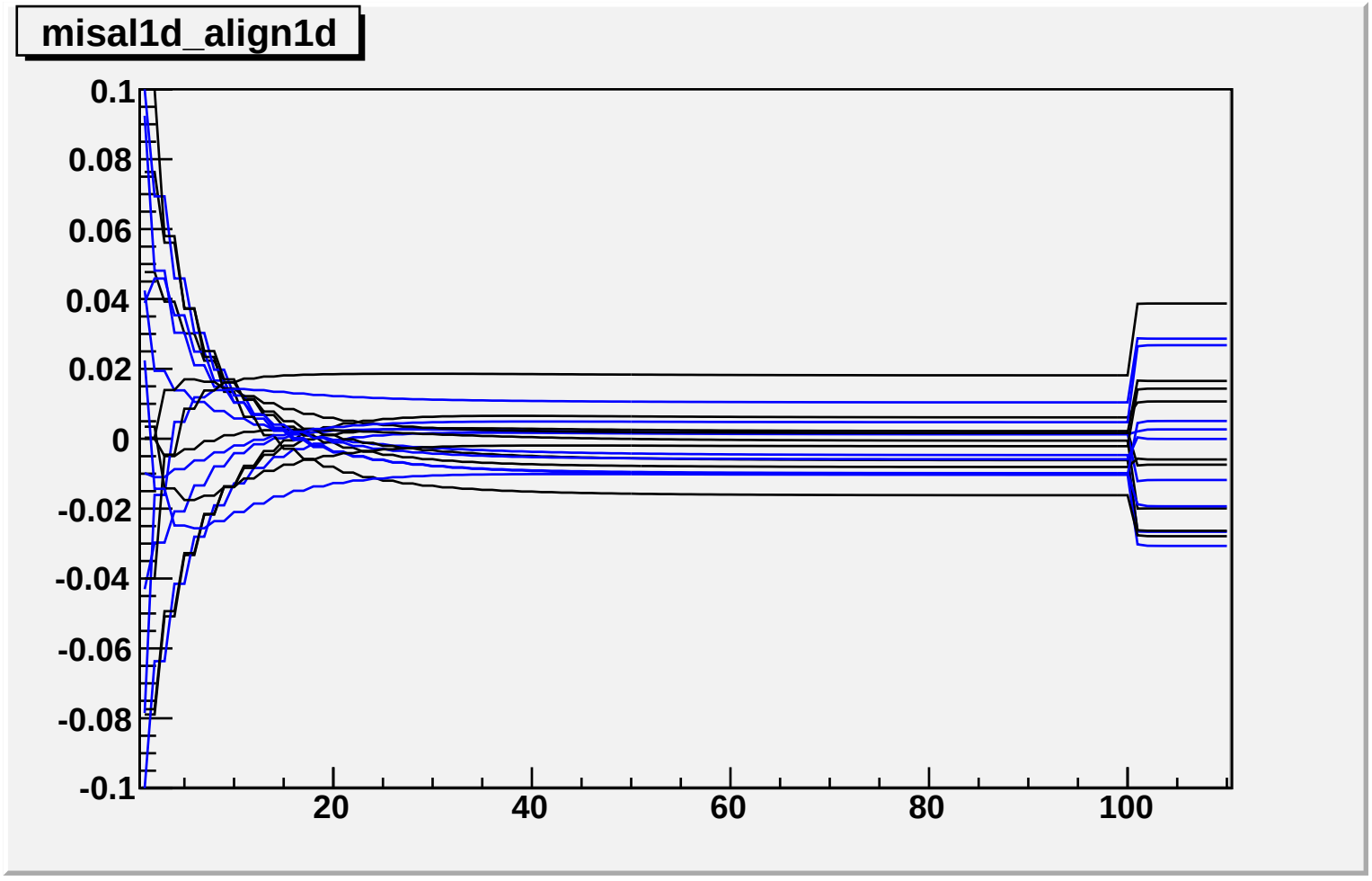
Using the even-odd procedure...



(In ME+2/1 with 1000 high-momentum tracks after overlap-selection)

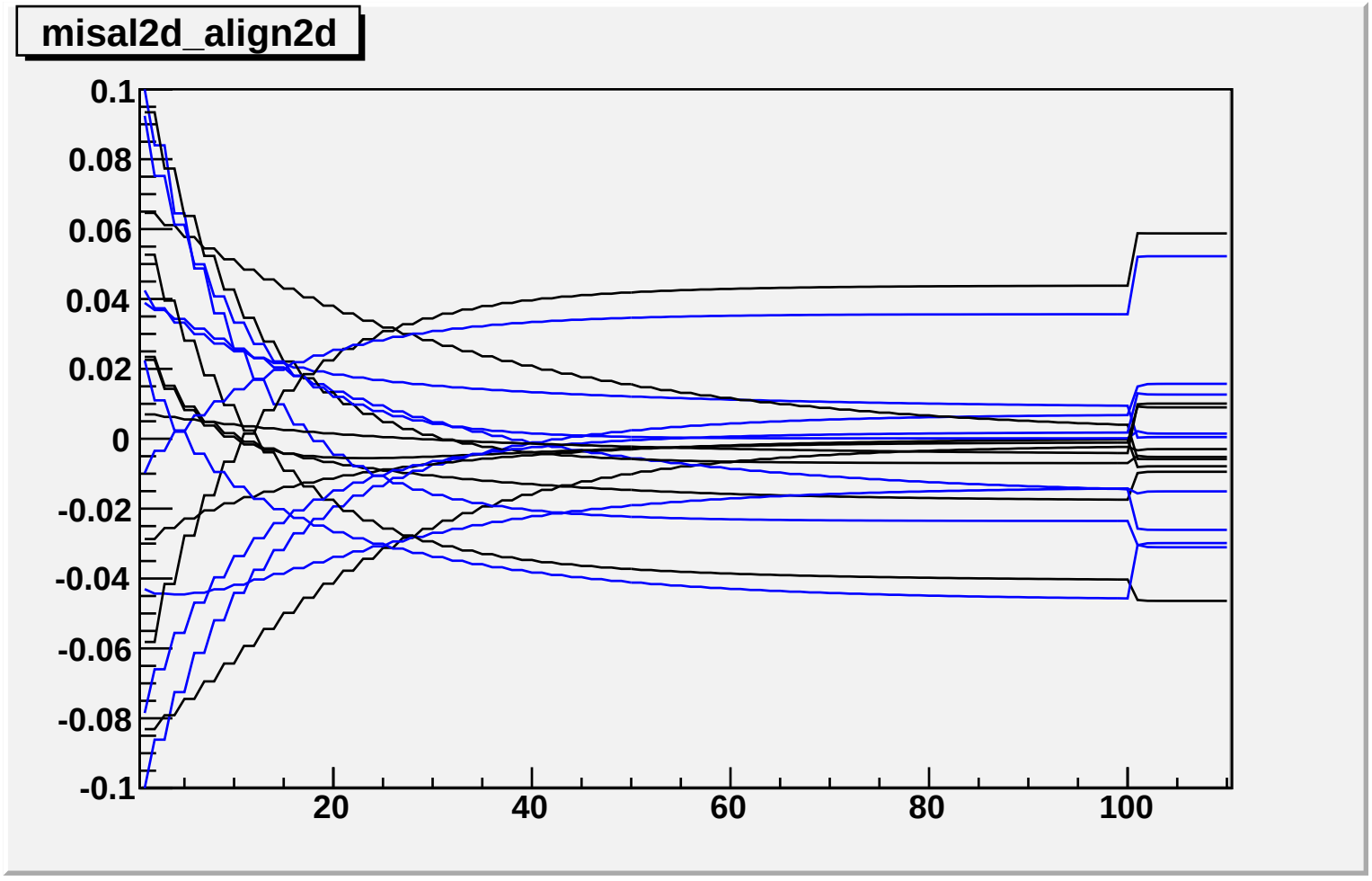
Local x alignment



Black are odd-numbered chambers, blue are even, cm from ideal position versus iteration, switch to global CSC ring alignment at iteration 100.

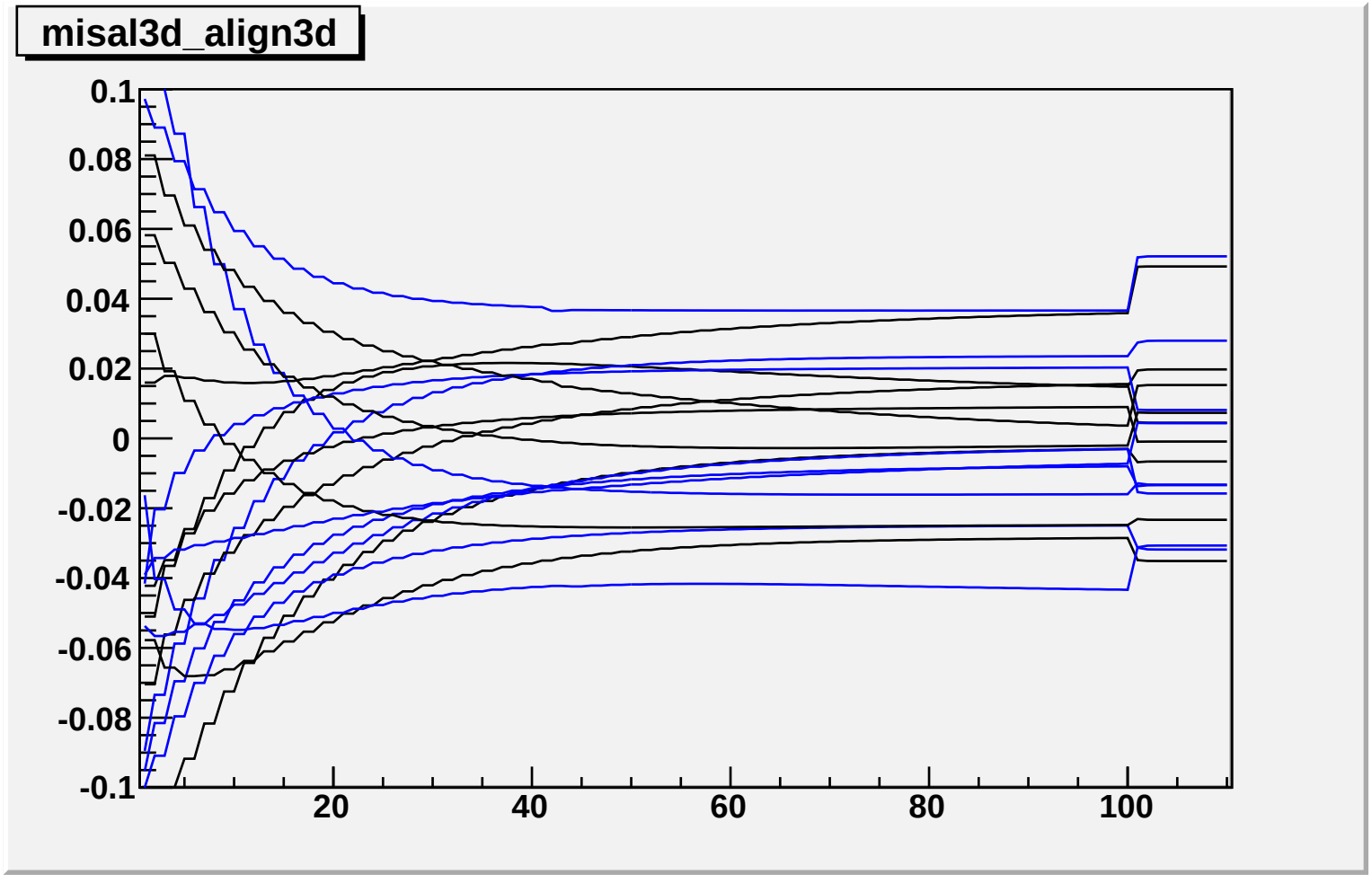
Only x is misaligned.

Local x alignment



Black are odd-numbered chambers, blue are even, cm from ideal position versus iteration, switch to global CSC ring alignment at iteration 100.
x and y are misaligned.

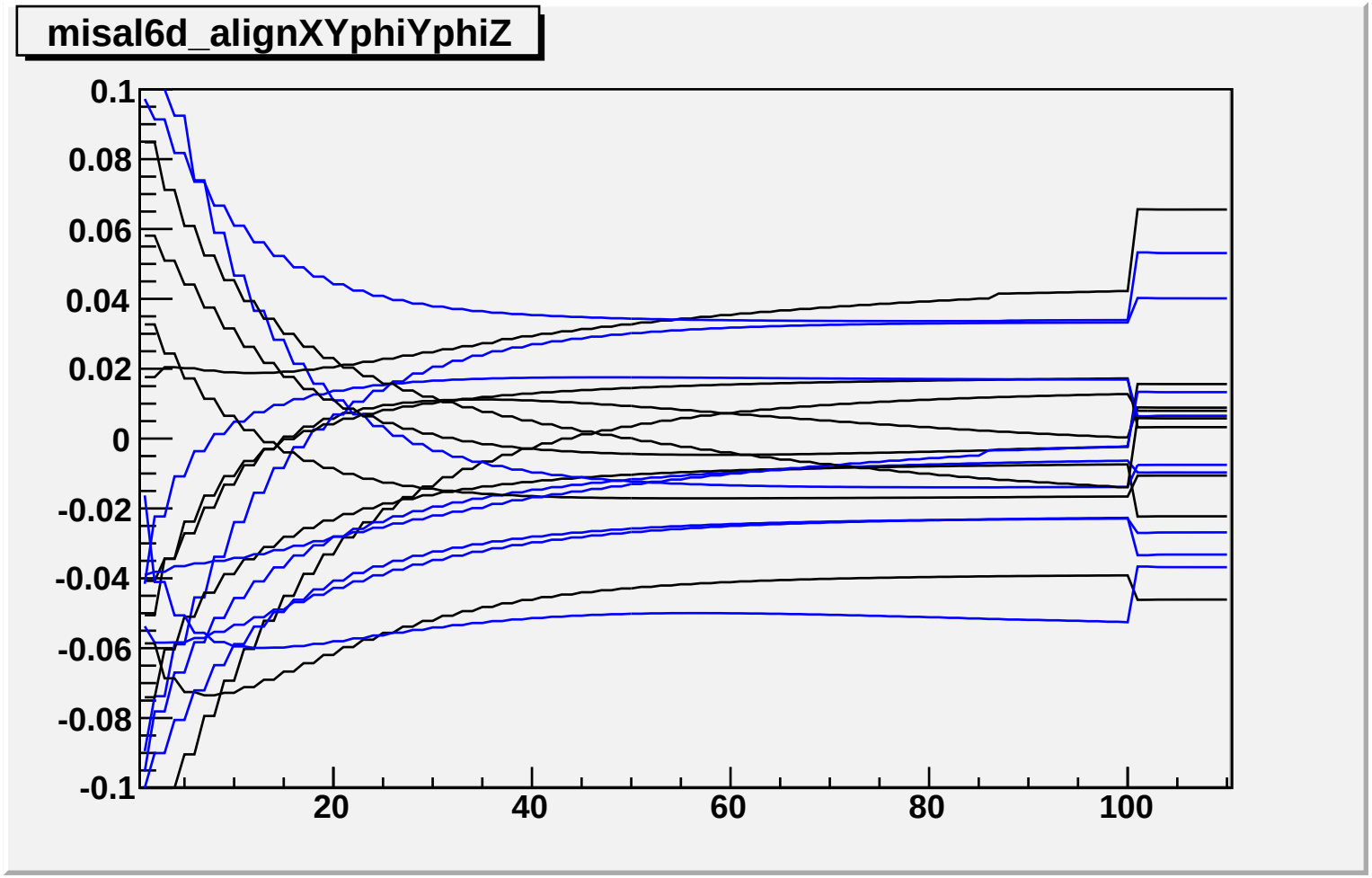
Local x alignment



Black are odd-numbered chambers, blue are even, cm from ideal position versus iteration, switch to global CSC ring alignment at iteration 100.

x, y, and ϕ_z are misaligned.

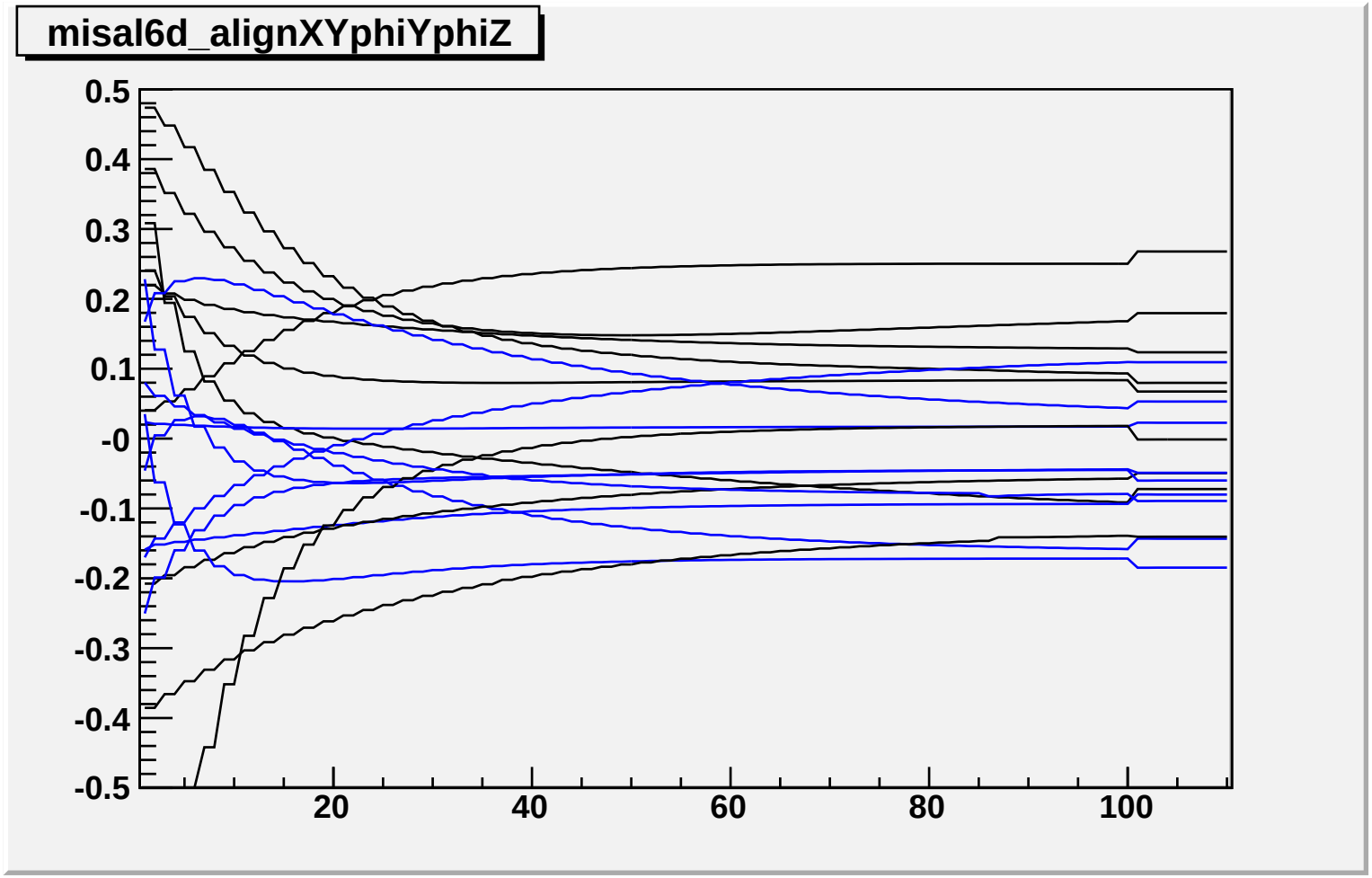
Local x alignment



Black are odd-numbered chambers, blue are even, cm from ideal position versus iteration, switch to global CSC ring alignment at iteration 100.

All DOF are misaligned; x, y, ϕ_y, and ϕ_z are re-aligned.

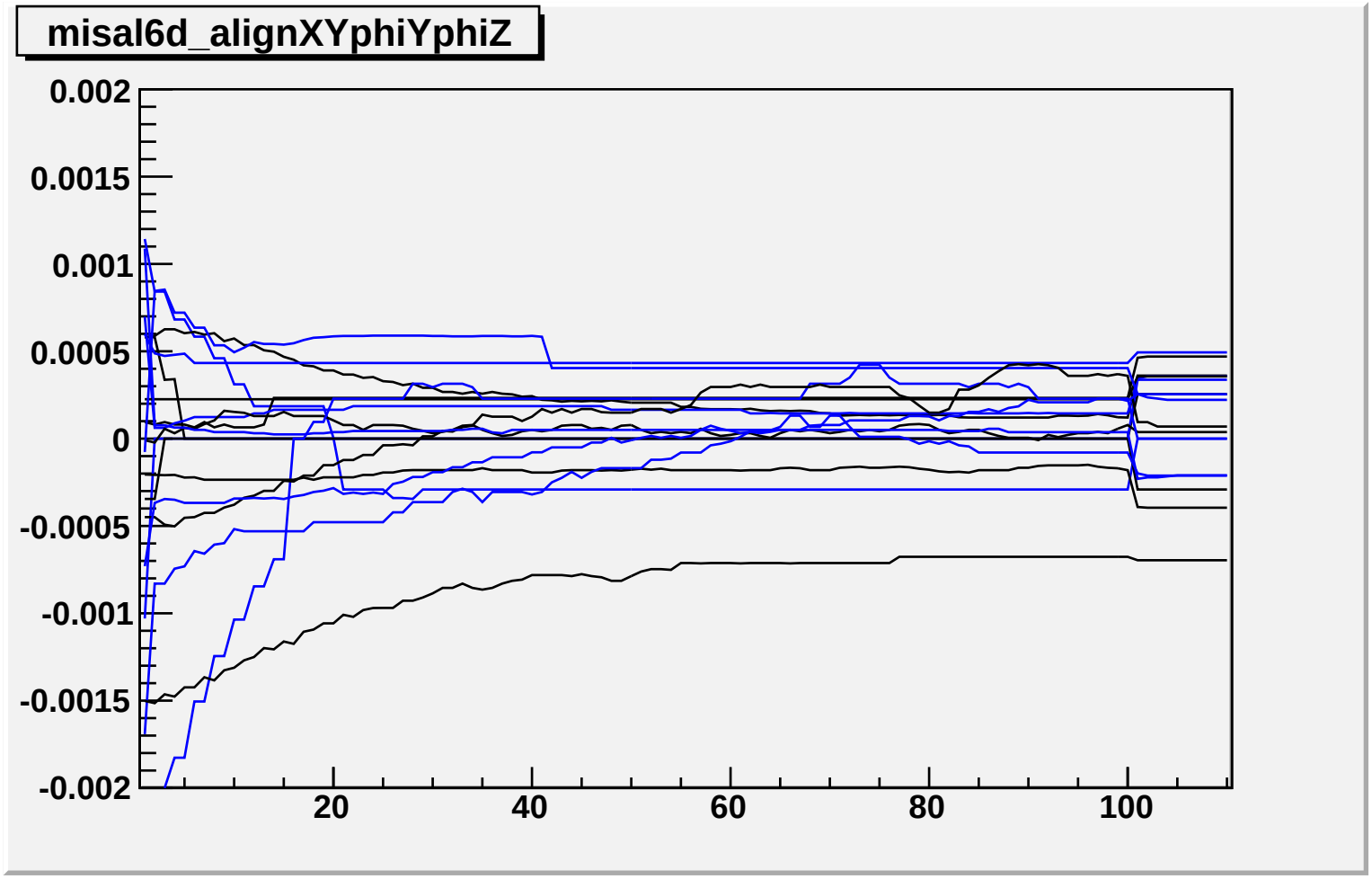
Local y alignment



Black are odd-numbered chambers, blue are even, cm from ideal position versus iteration, switch to global CSC ring alignment at iteration 100.

All DOF are misaligned; x, y, ϕ_y, and ϕ_z are re-aligned.

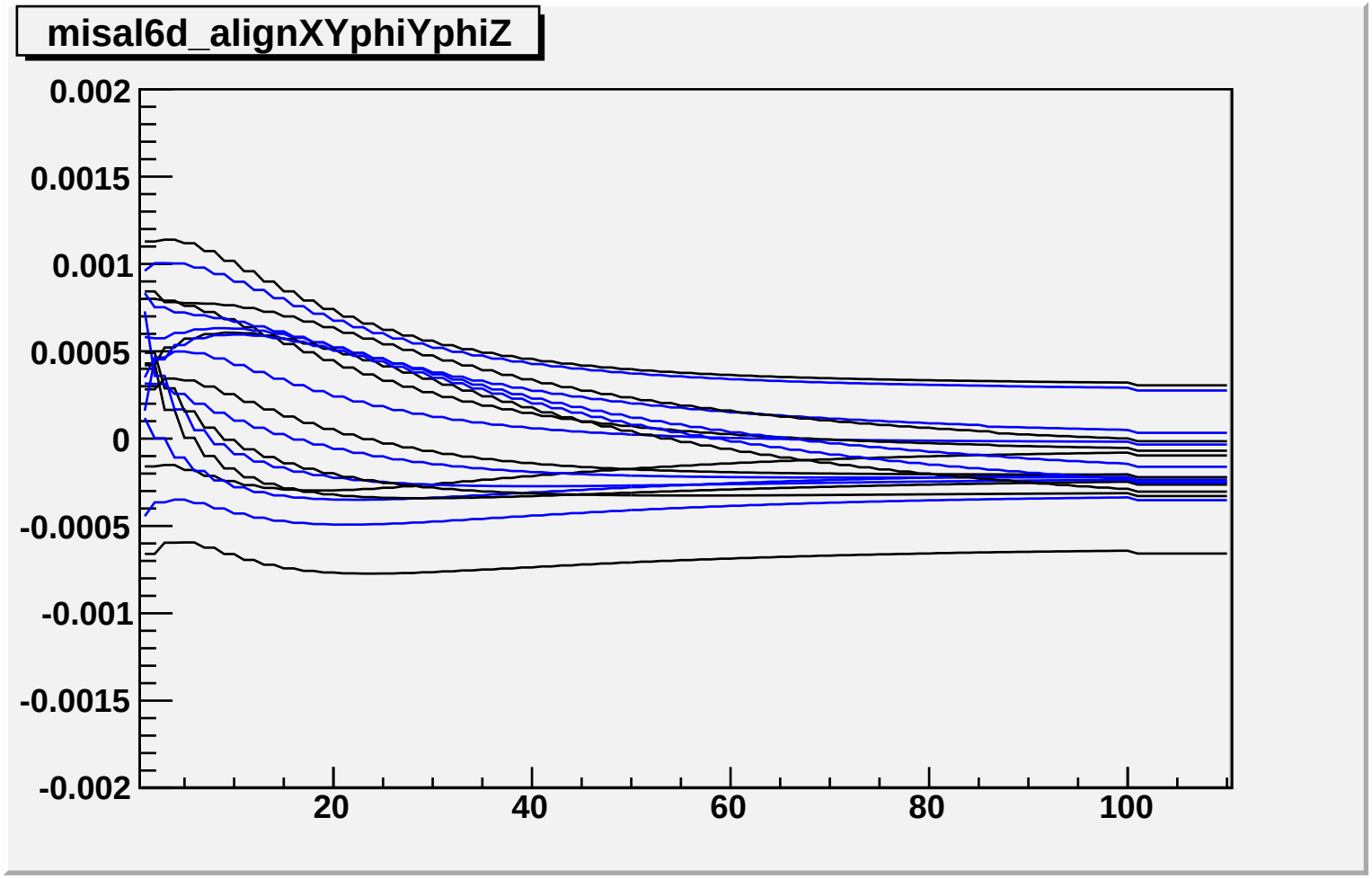
Local ϕ_y alignment



Black are odd-numbered chambers, blue are even, rad from ideal position versus iteration, switch to global CSC ring alignment at iteration 100.

All DOF are misaligned; x, y, ϕ_y, and ϕ_z are re-aligned.

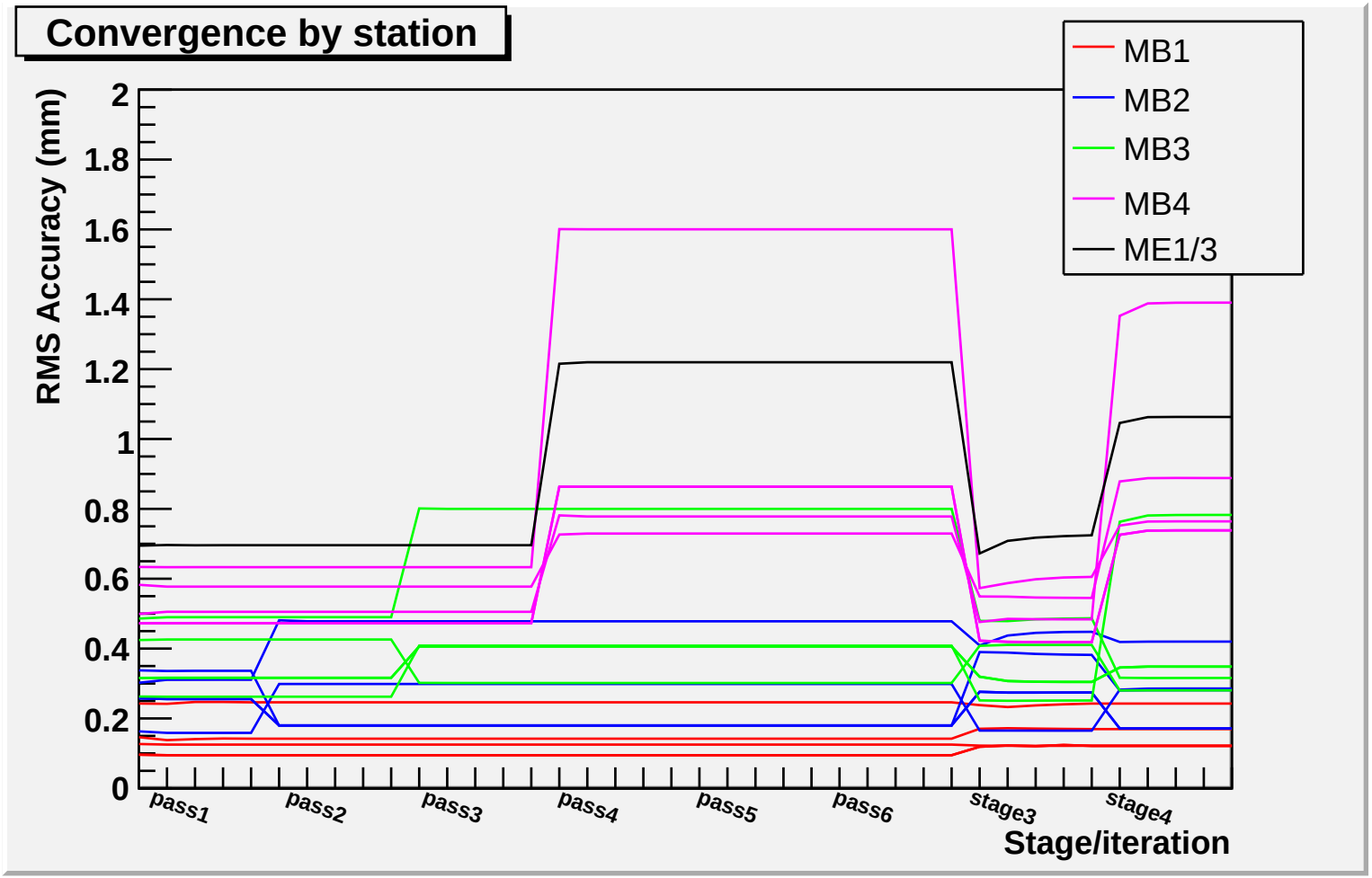
Local ϕ_z alignment



Black are odd-numbered chambers, blue are even, rad from ideal position versus iteration, switch to global CSC ring alignment at iteration 100.

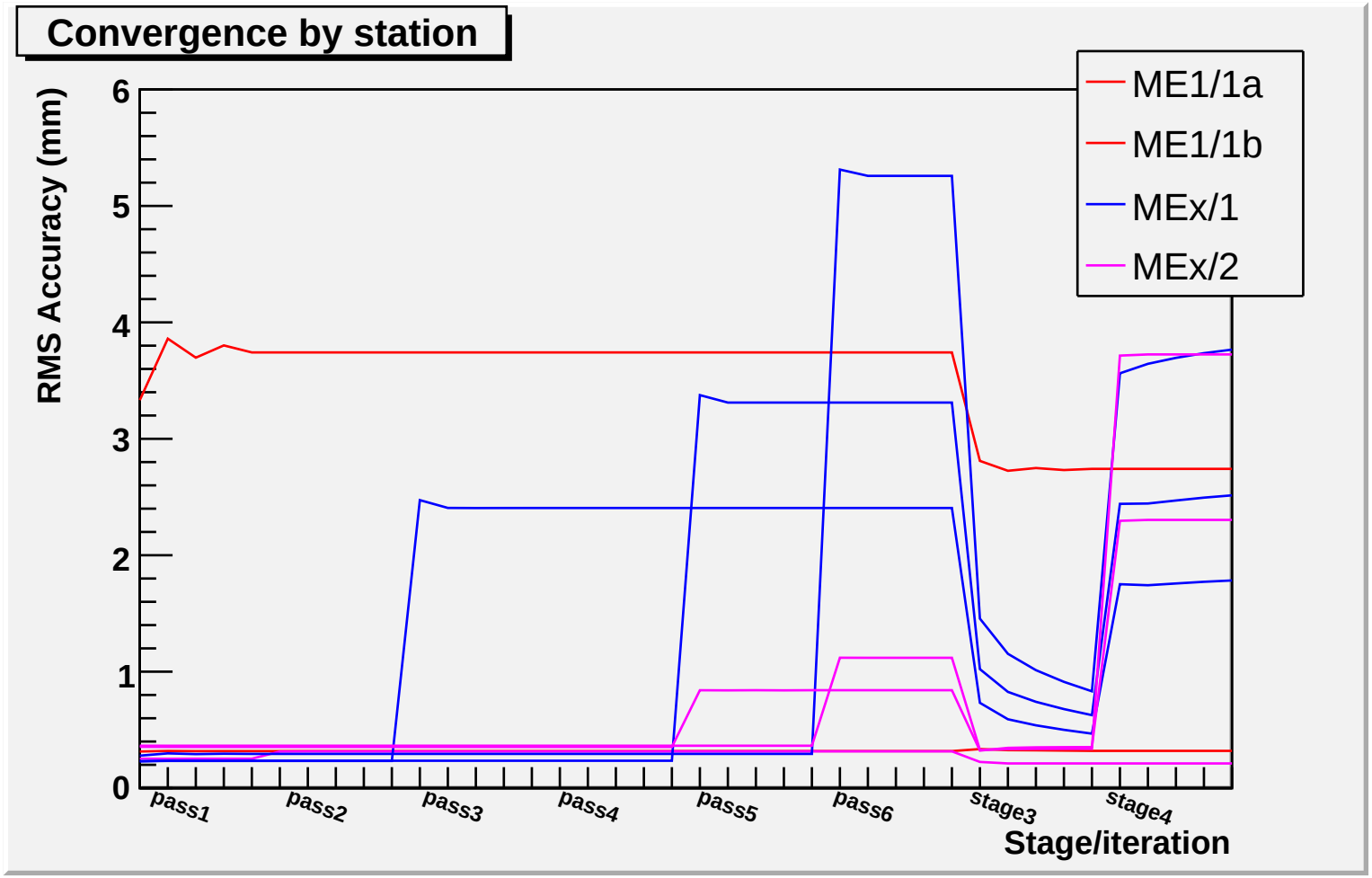
All DOF are misaligned; x, y, ϕ_y, and ϕ_z are re-aligned.

Baseline procedure: new barrel



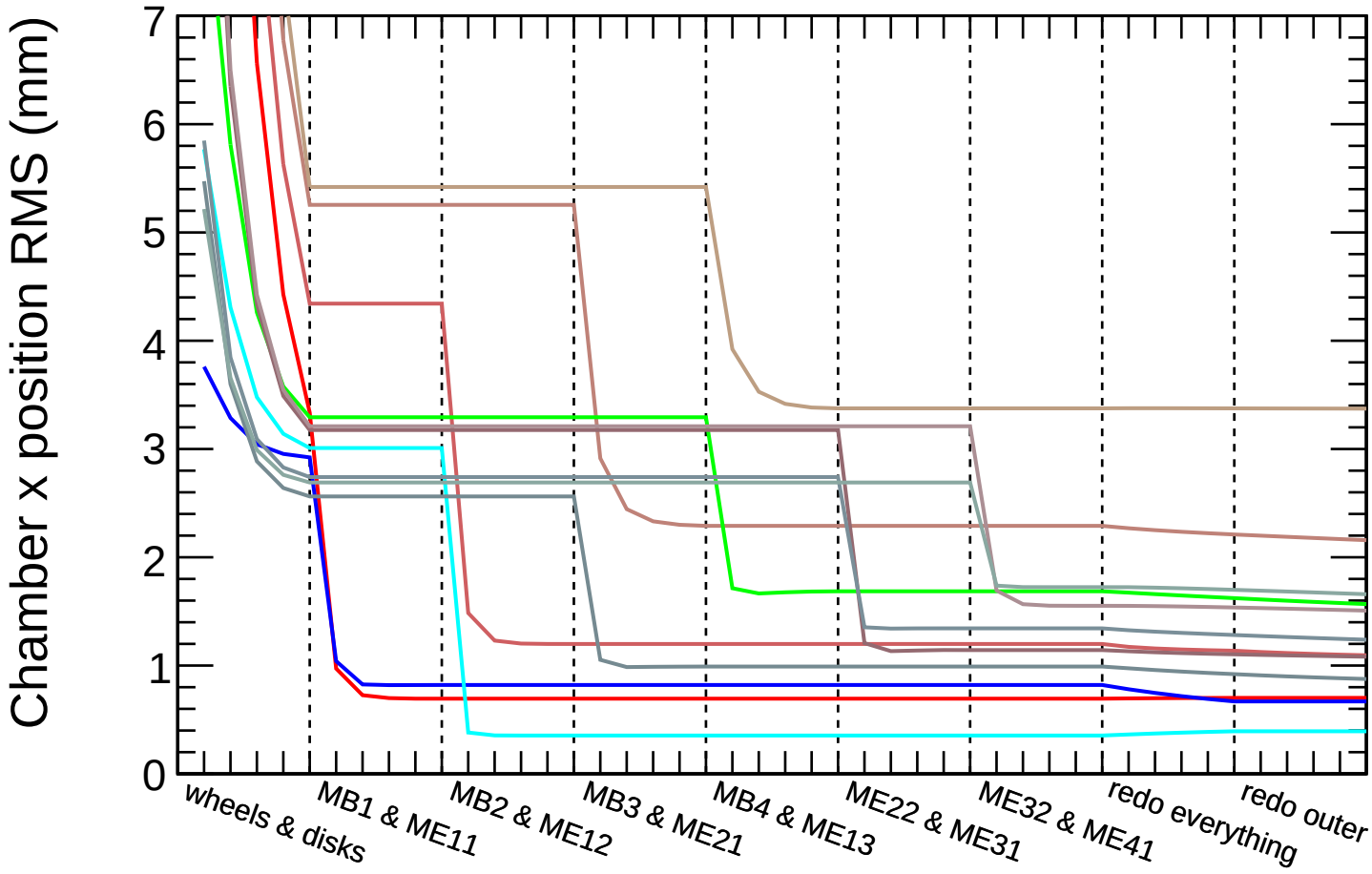
What we're looking at is *after* the wheel/disk and first iteration. Unlike old baseline, I allow *all* stations to align with APE $= \infty$ in the first step. Also, new APEs are only 0 and ∞, not carefully tuned.

Baseline procedure: new endcap



What we're looking at is *after* the wheel/disk and first iteration. Unlike old baseline, I allow *all* stations to align with APE $= \infty$ in the first step. The outlying ME1/1b is clearly a bug.

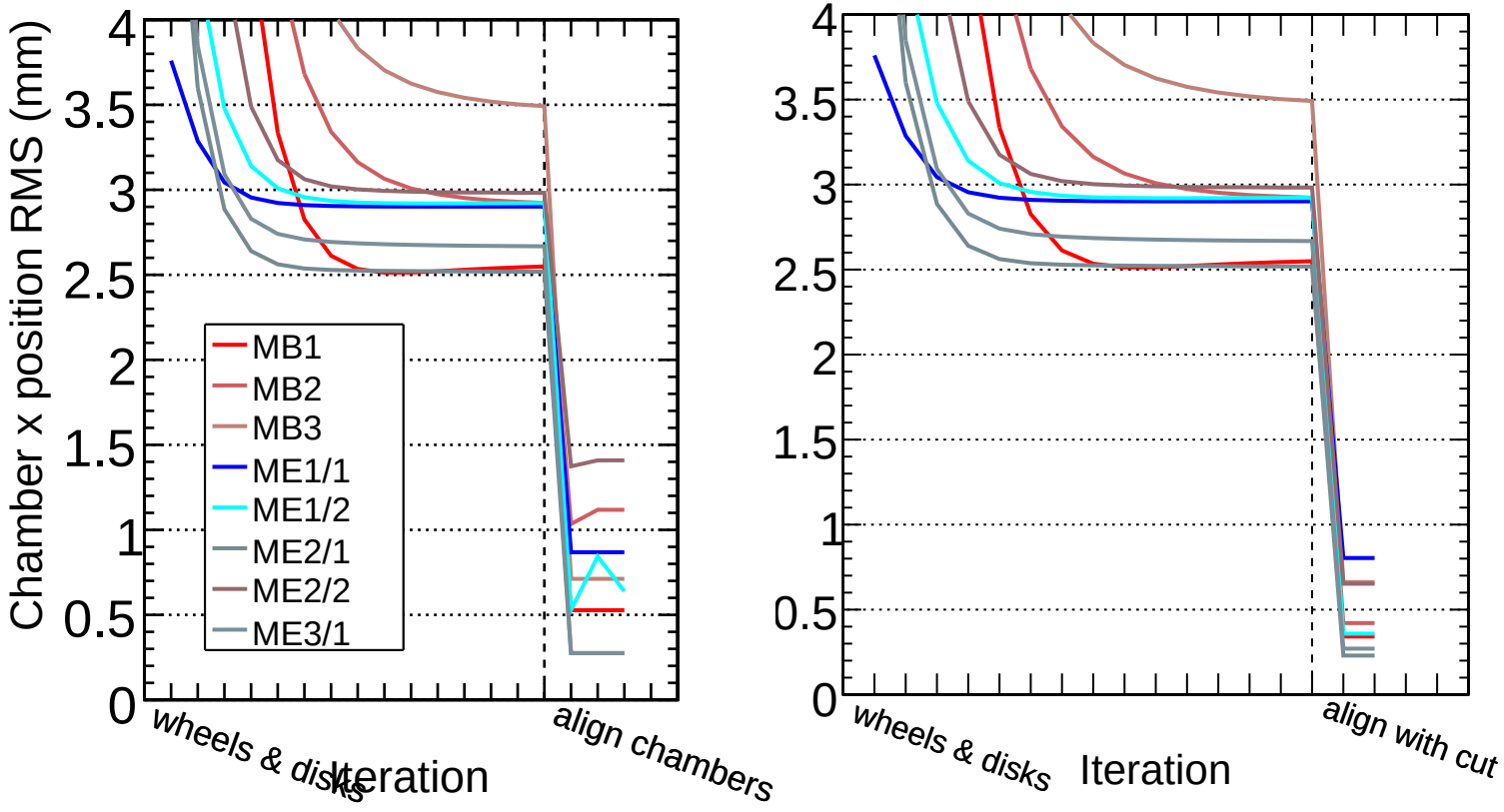
Baseline procedure: old



Old baseline had too few wheel/disk iterations using too much data.

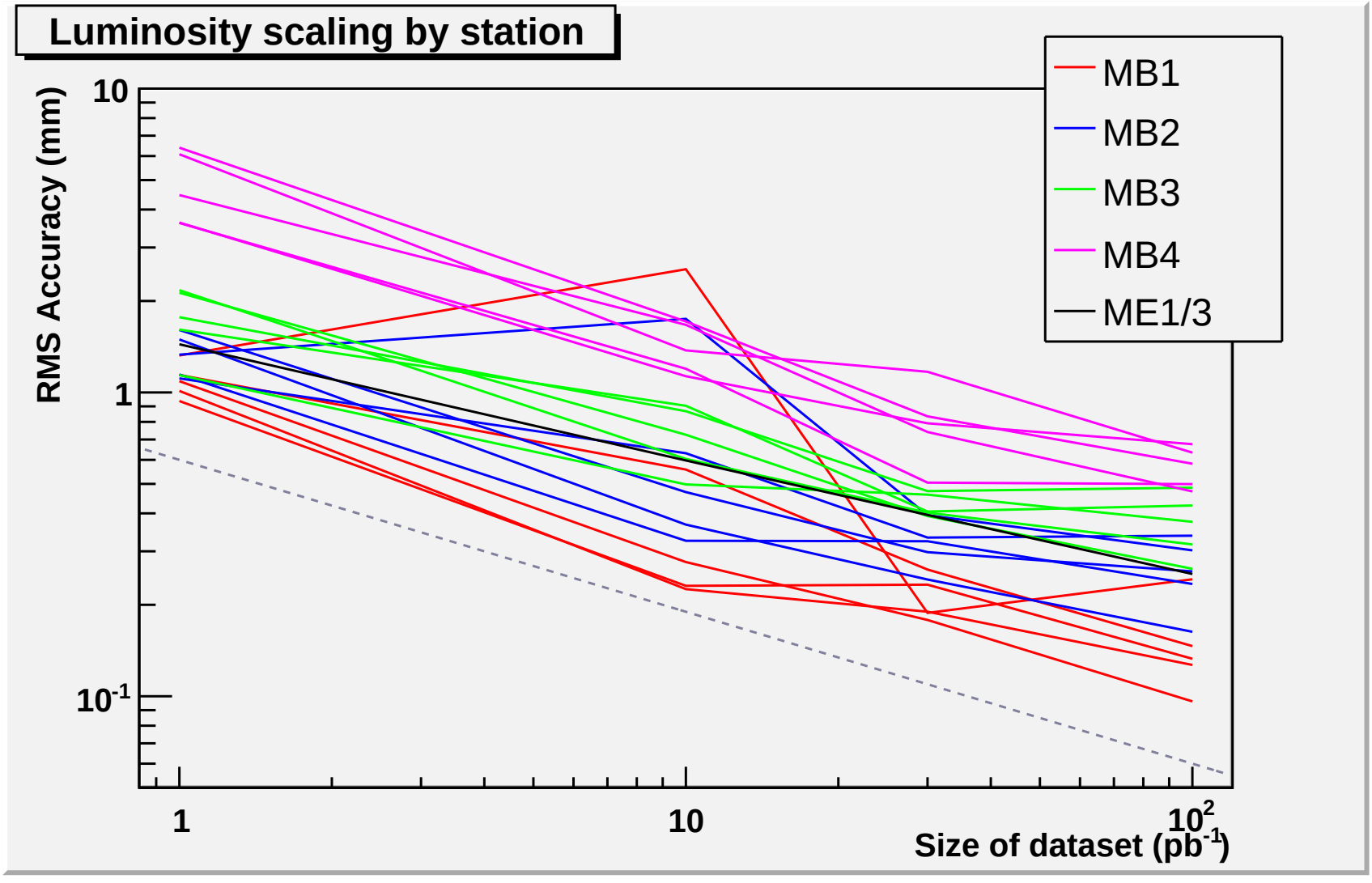
Why don't I see improvement in stage 3 (redo everything)? The stopping condition?

Baseline procedure: old



Fairest comparison from old plots: one iteration *without* track cut (left) after wheel/disk. Old results are about 2× worse.

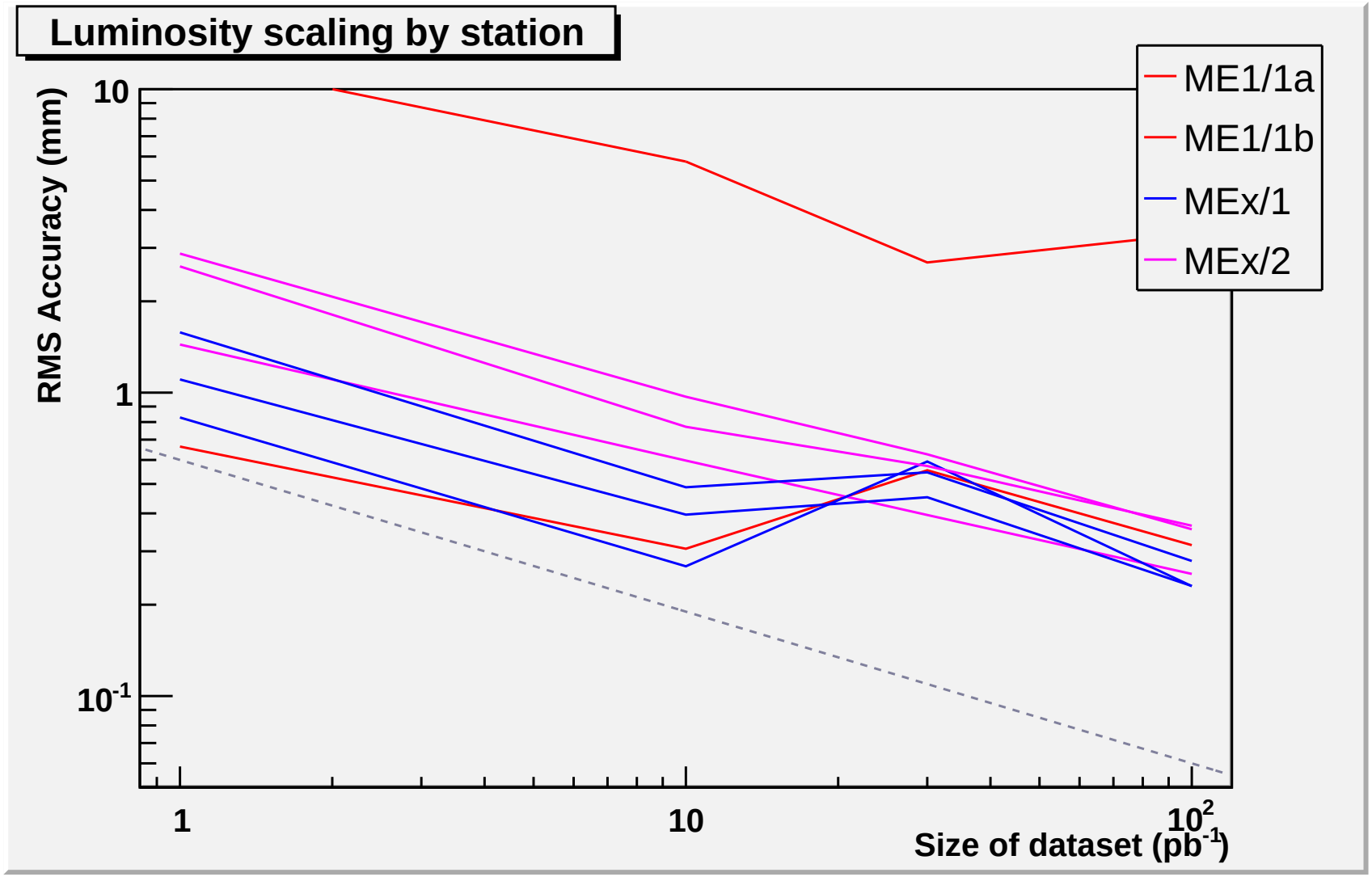
Luminosity scaling: barrel



(using the new procedure)

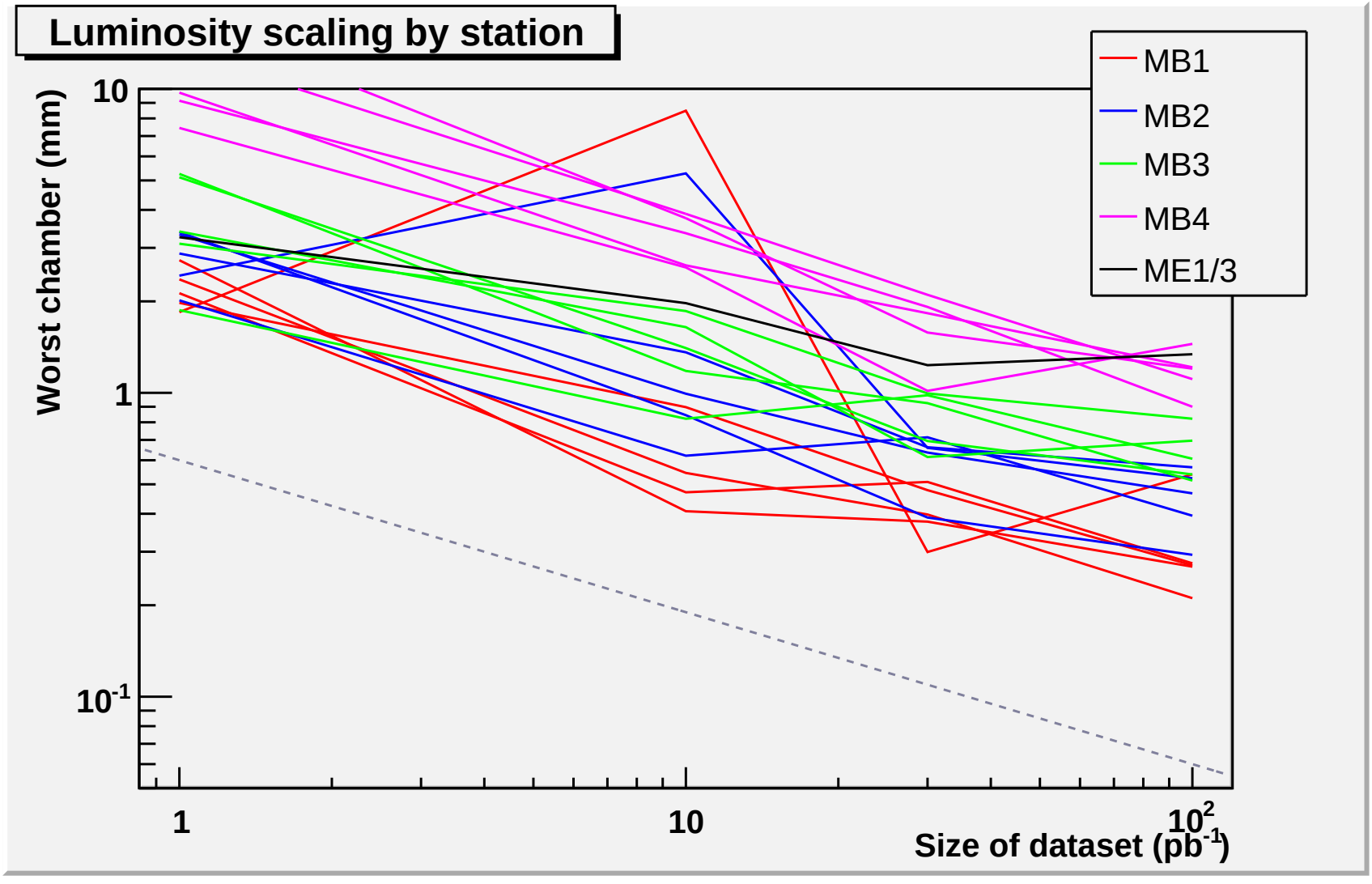
Kinks at 10 pb^{-1} are due to single chambers in ME2/1 and ME2/2.

Luminosity scaling: endcap



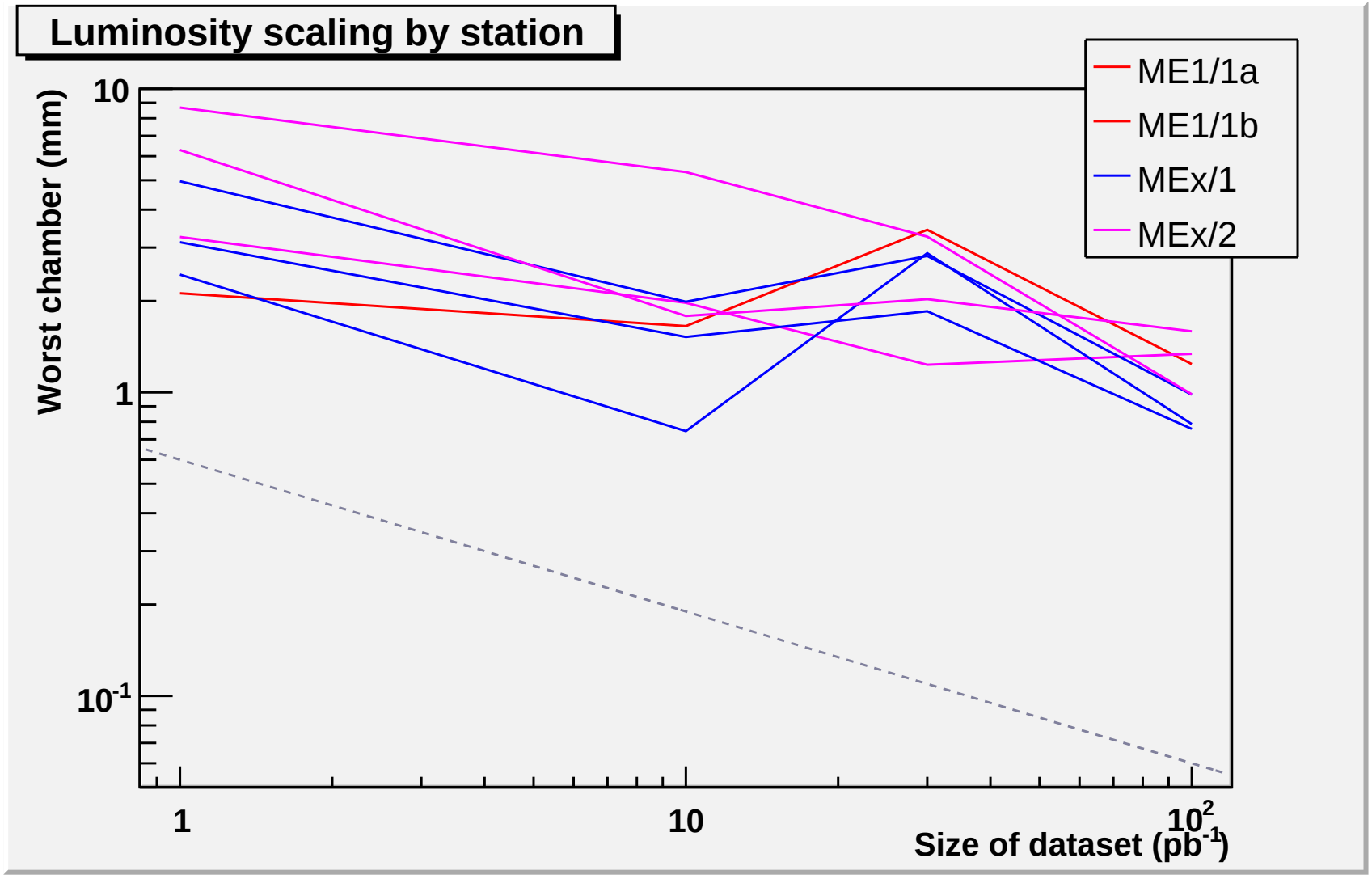
(using the new procedure)

Worst chambers: barrel



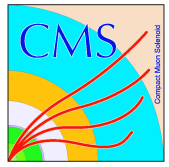
(using the new procedure)

Worst chambers: endcap



(using the new procedure)

Survey constraints



By actually attempting to do an alignment with survey constraints, I found some show-stoppers and near-show-stoppers:

- The constraint has only been implemented with 6 degrees of freedom. MB4 cannot and CSCs should not be allowed to align in all 6 degrees of freedom. Someone would need to make the implementation more general to use it in the muon system.
- We wanted to use the constraints to rein in chambers that wander due to wierd tracks (multiple scattering). That suggests that the weight of the constraint should scale with the number of hits, so that we can set the degree of competition between hits and constraints independently of the number of hits on a chamber. They actually designed a constraint that does not depend on the number of hits; it seems to be intended to fill in for missing track data.
- The software assumes that we would never align objects that are not direct descendents of each other in the hierarchy: DTChambers and CSCChambers are third cousins. That's surmountable, but may require some interface changes.