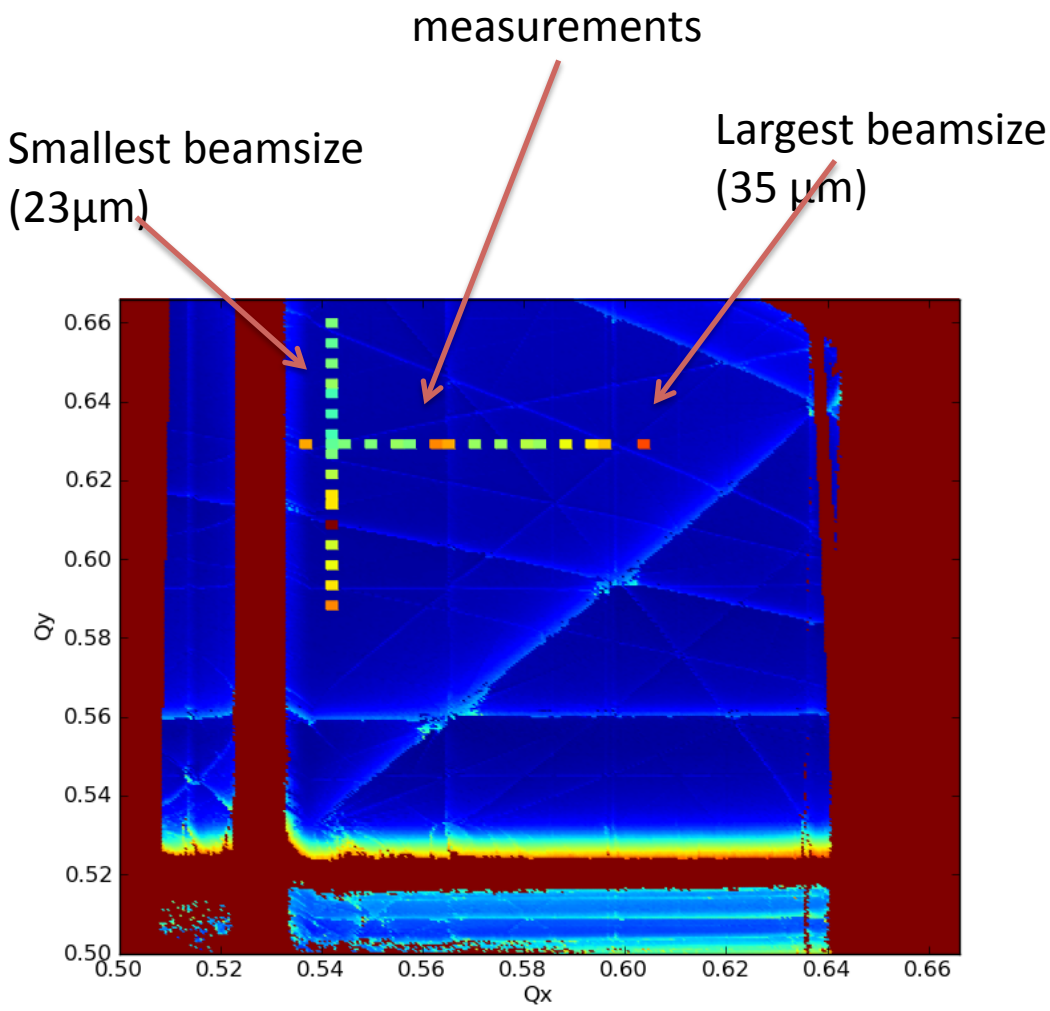
CesrTA- Low Emittance Tuning

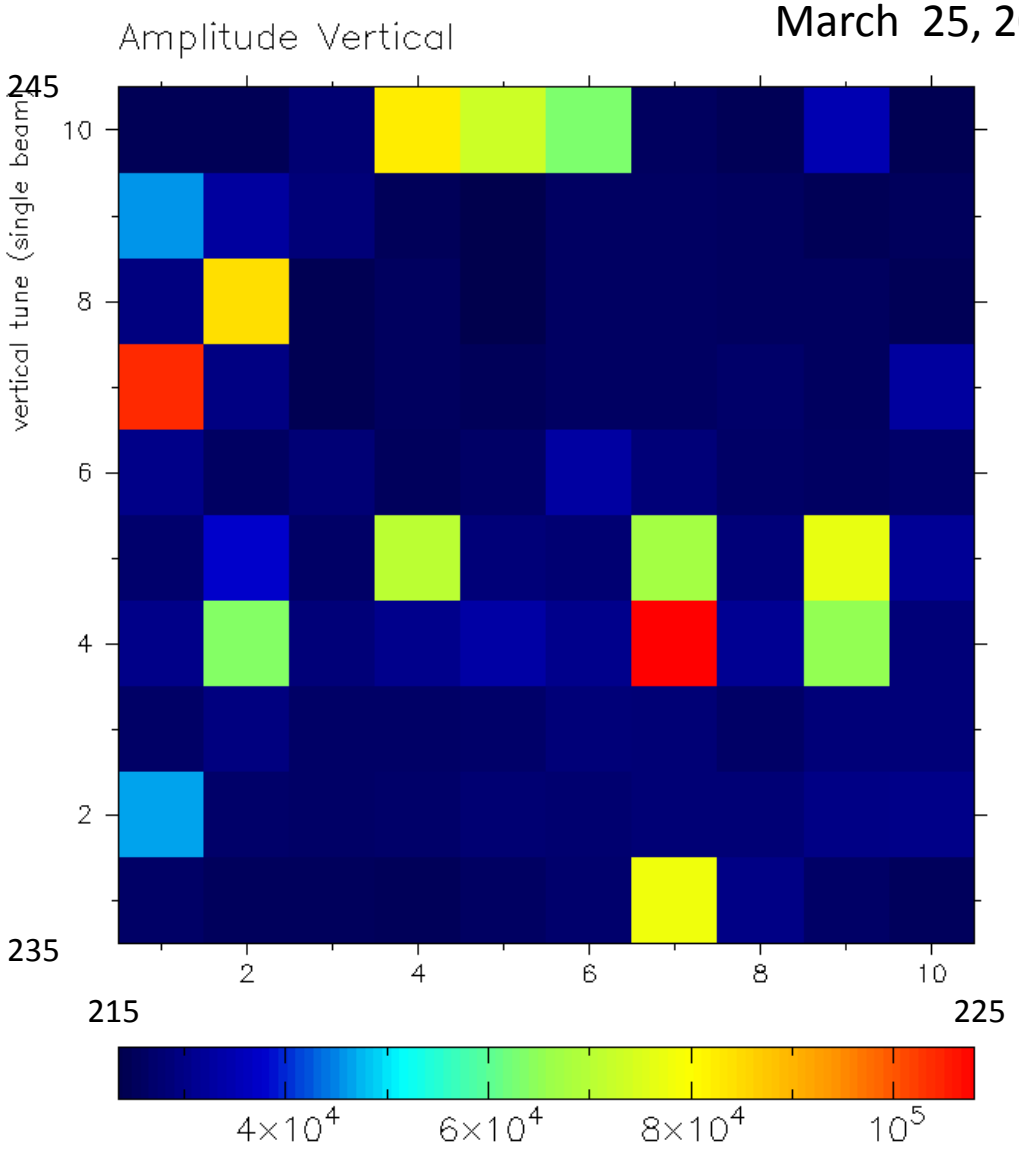
We have completed a very cursory measurement of the dependence of beam size on betatron tune using the xray – BSM. We observe a strong tune dependence. Even over the limited part of the tune plane that we have explored we find beam size varies from 23µm to 35µm (31pm < ε < 72 pm).

During the next CesrTA run we will complete a detailed scan of the tune plane and investigate alternative sextupole distributions to reduce reson



simulation

March 25, 2010



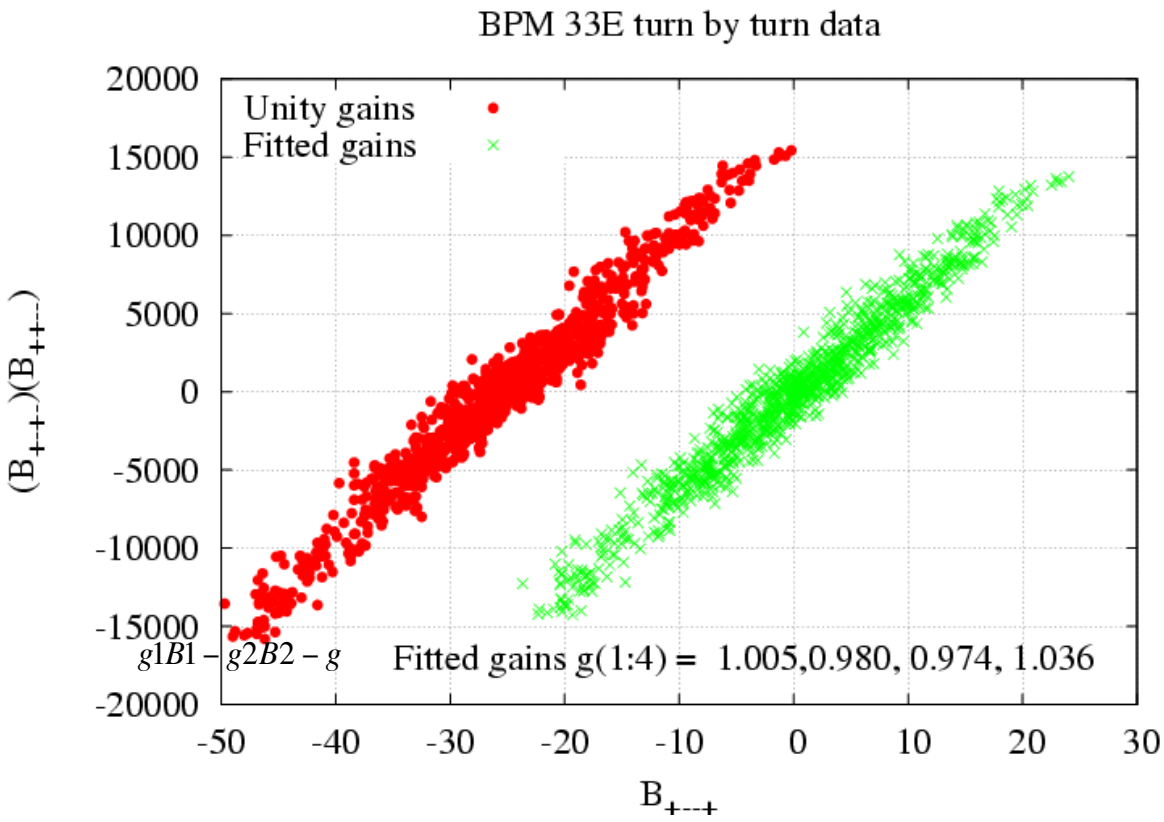
Beam size nm

XBSM

CesrTA Low Emittance Tuning

Measurement of emittance diluting effects of transverse coupling and vertical dispersion requires precision calibration of BPM button gains

We have developed a beam based gain mapping technique that yields relative button gains in each BPM with <0.3% precision.



In a four button BPM with mirror symmetry, if all buttons have the same gain, then the button signals are related according to

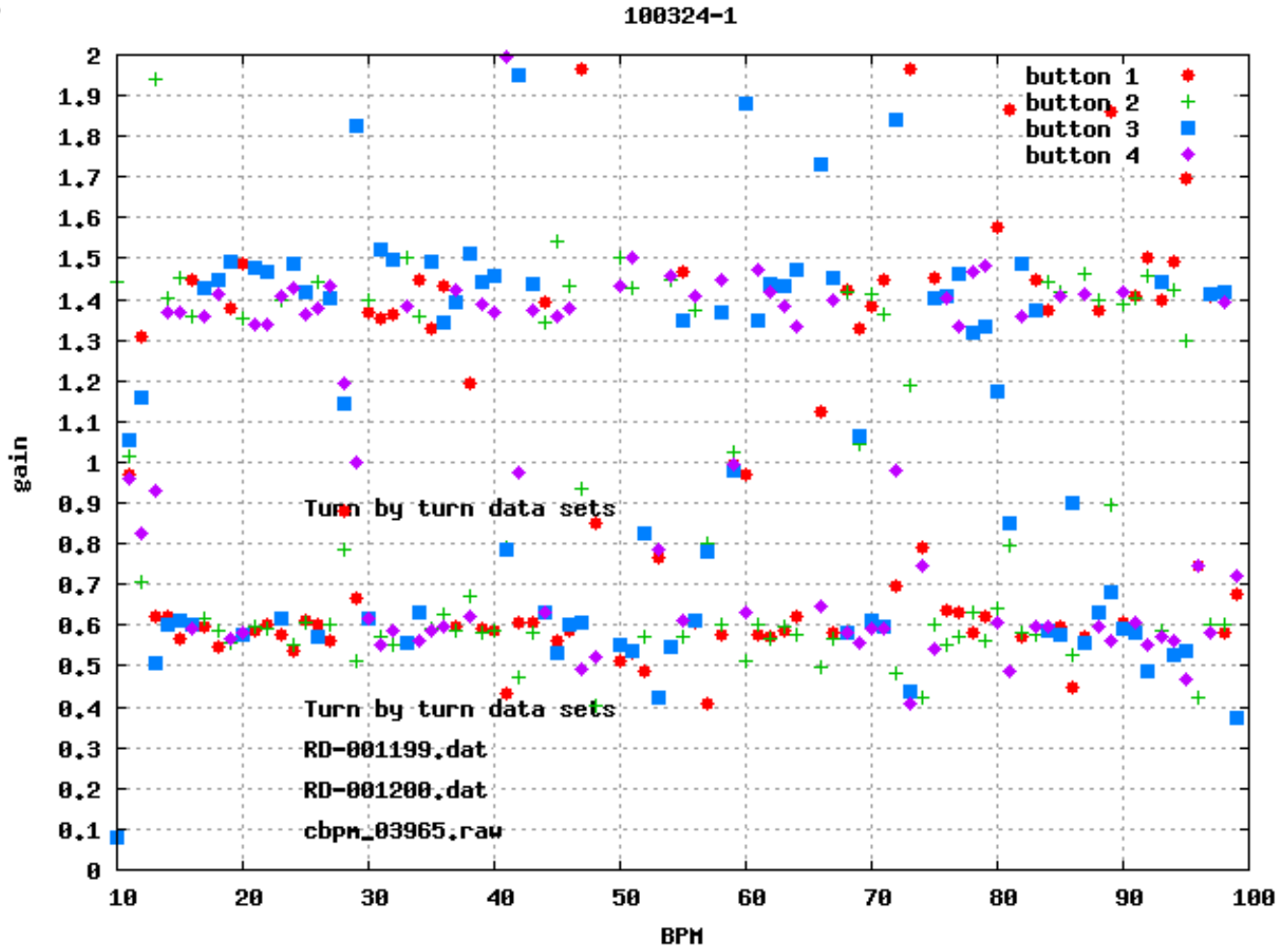
$$(B_1 + B_2 - B_3 - B_4)(B_1 - B_2 + B_3 - B_4) = c(B_1 - B_2 - B_3 + B_4)$$

Red points: measured turn by turn, resonantly excited, data – 1000 turns – Button gains are evidently not all equal since the points do not include (0,0) as required by the fundamental equation

Green points: replot the same data after correcting each button signal with fitted gains(1:4) 1.005, 0.980, 0.974, 1.036

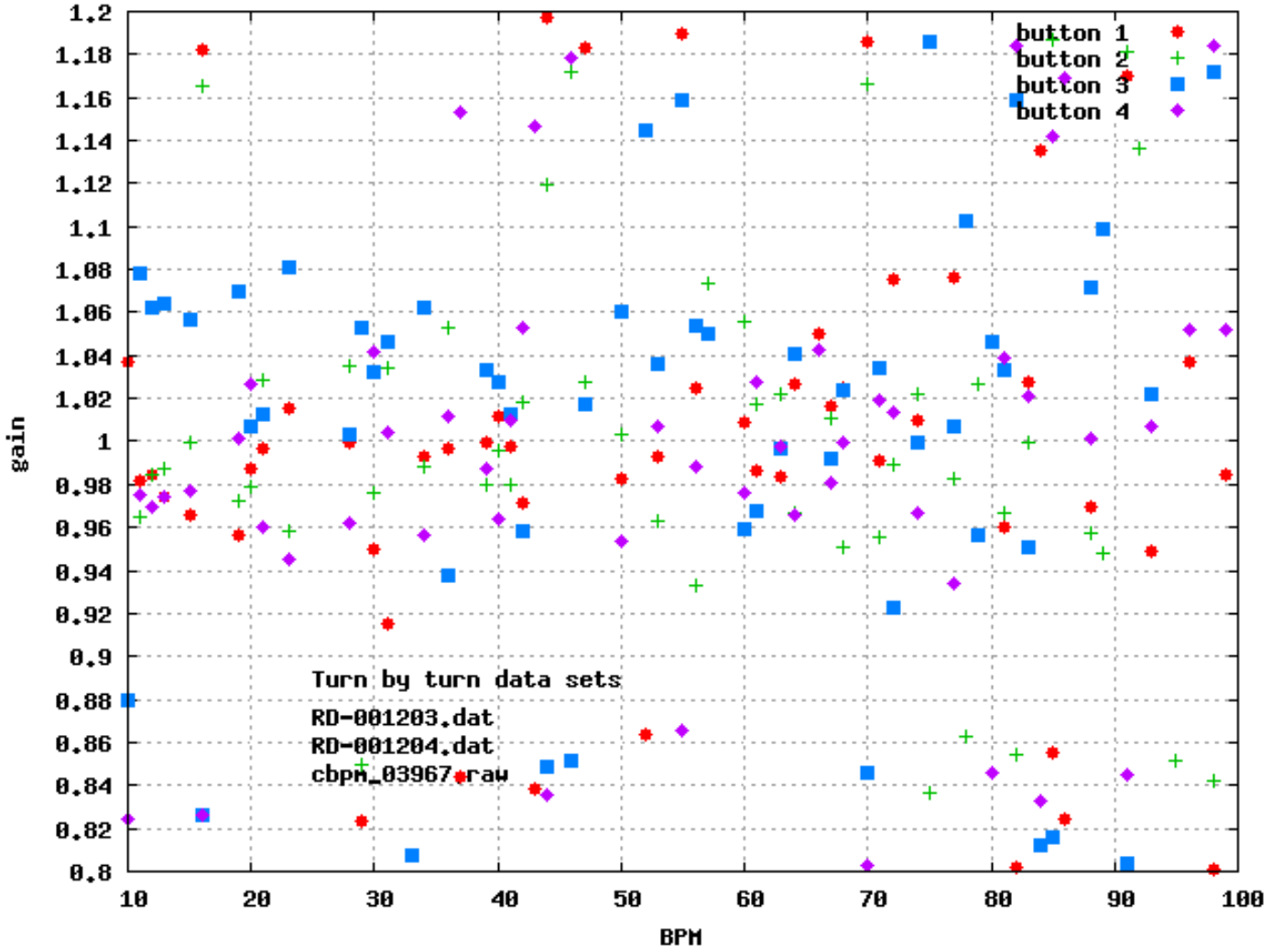
5.3GeV
Chess_20090225

Longitudinal instability ?



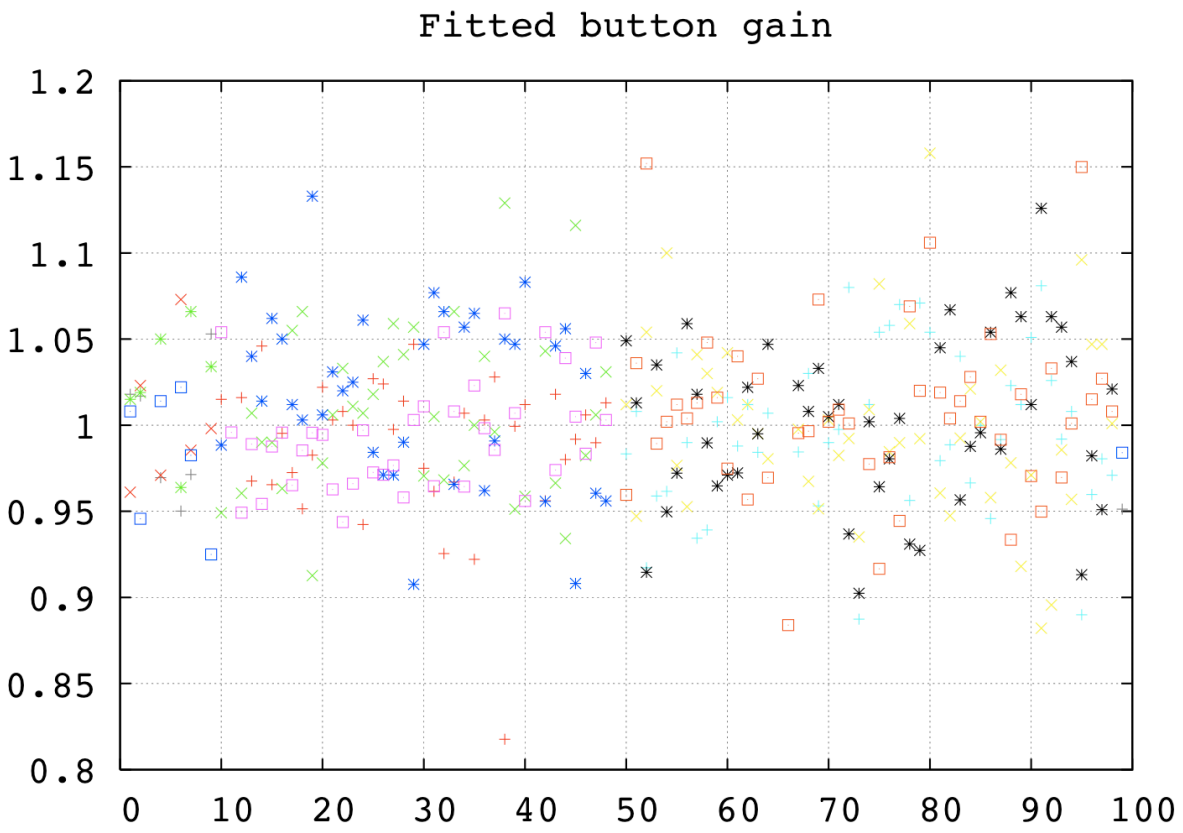
5.289 GeV
Chess_20090225

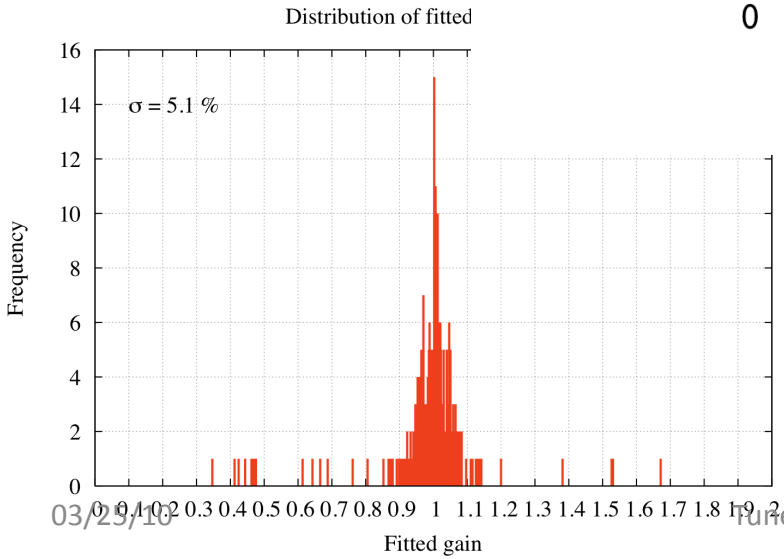
Adjust horizontal tune
- Eliminate instability that appears on synch light monitor



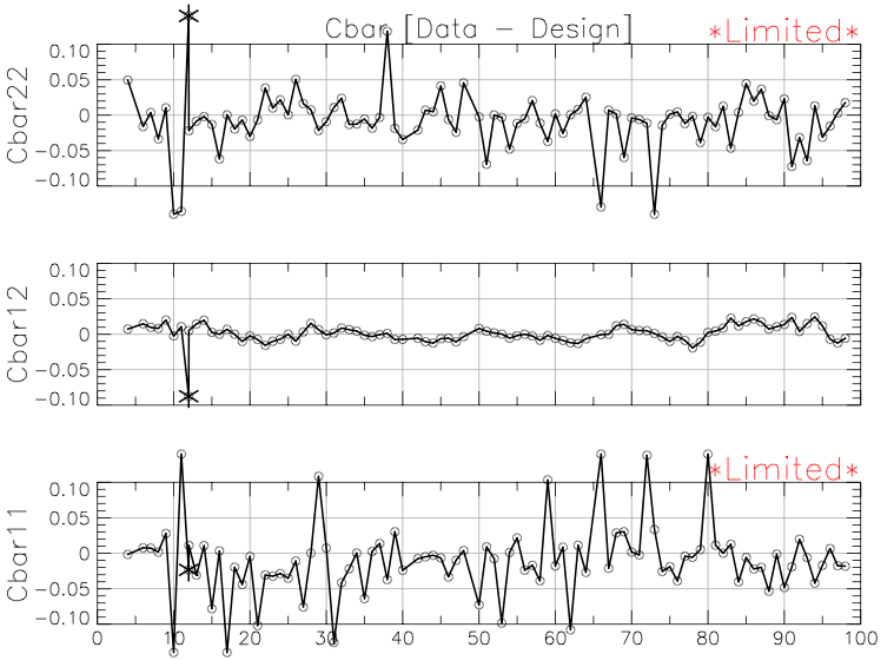
2.085GeV

Cta_2085mev_xr20m_20091205

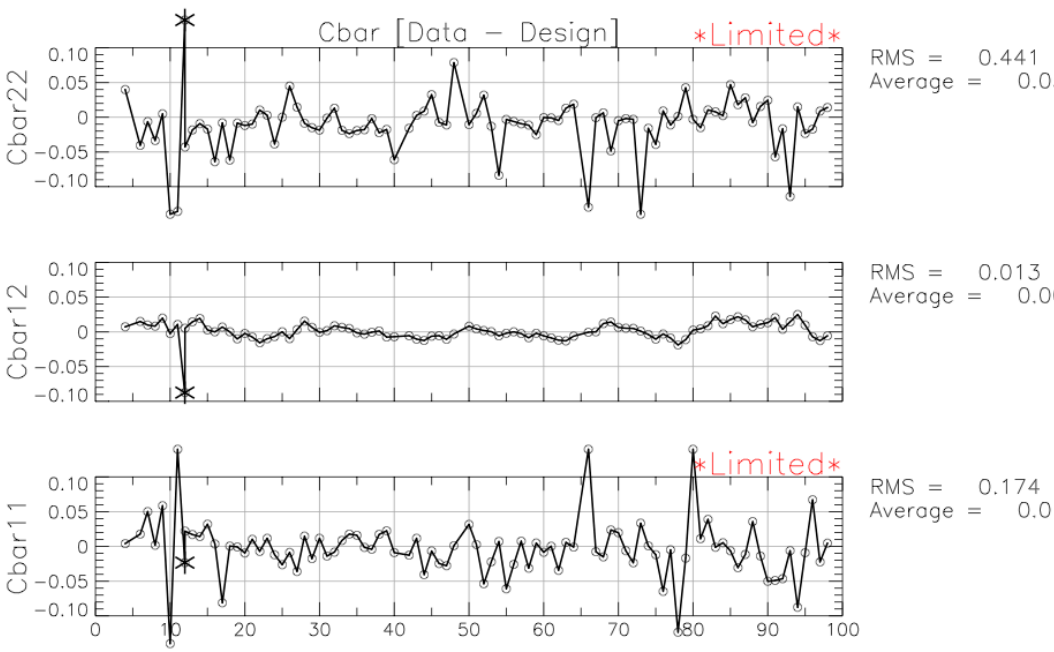




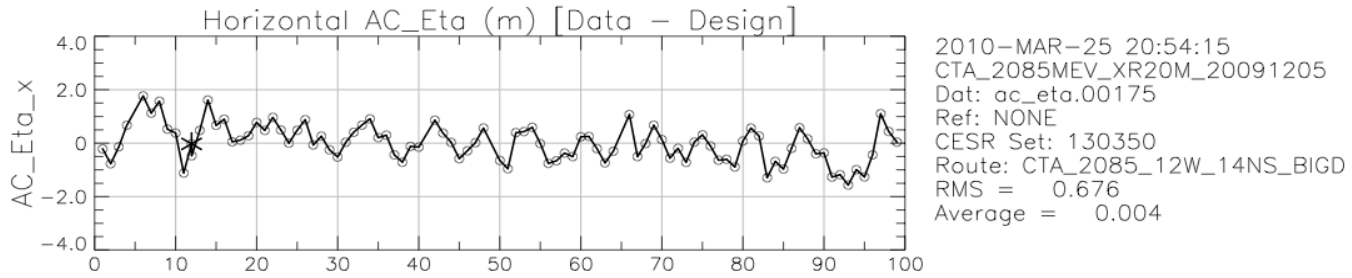
No gain correction

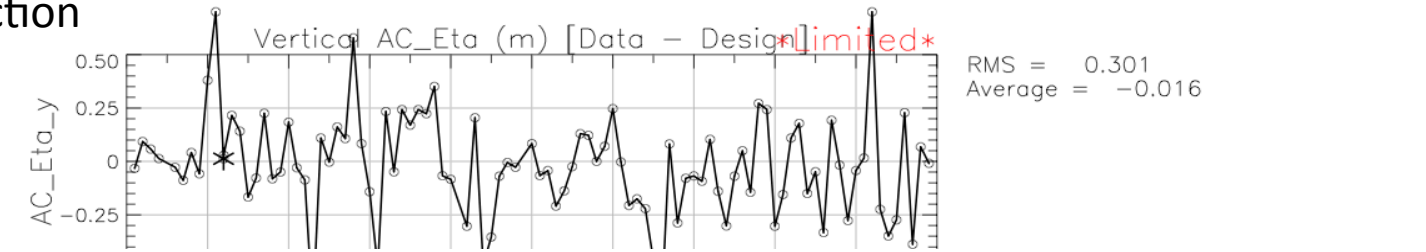


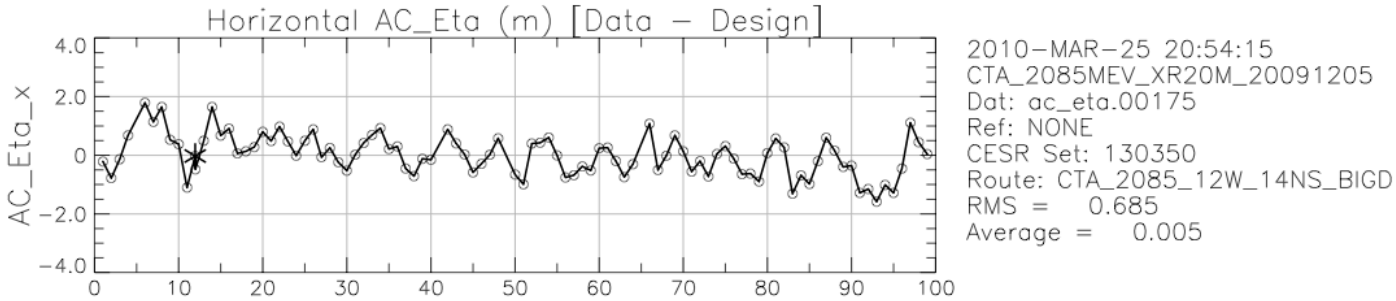
With gain correction



No gain correction







With gain correction

