

Off-momentum Beta-beat Correction

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General

- 1) With the beam left from ramp optics correction, we had about 1.5 hours of Blue ring as schedule.
- 2) Chuyu applied store gradient error corrections. We first measured off-momentum betas with sextupole corrections with 24 families.
- 3) After applied 24 sextupole family correction, we observed a large beam loss in Blue. Correction Failed.

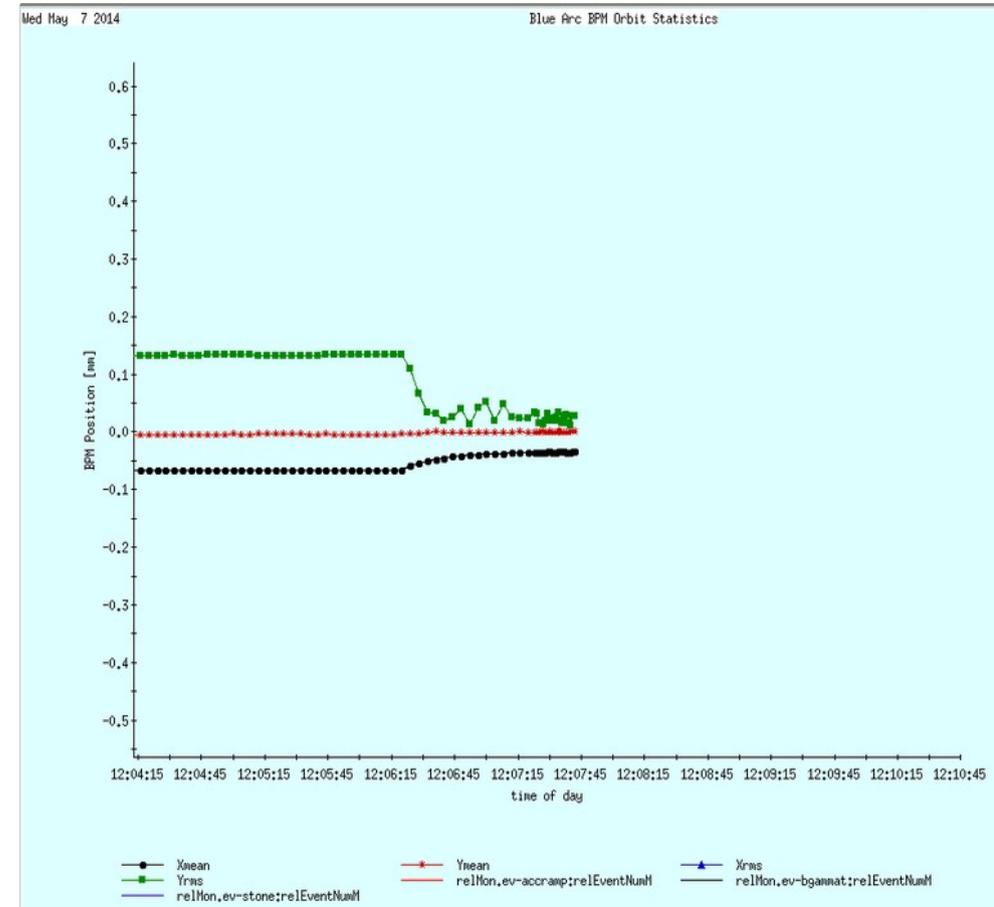
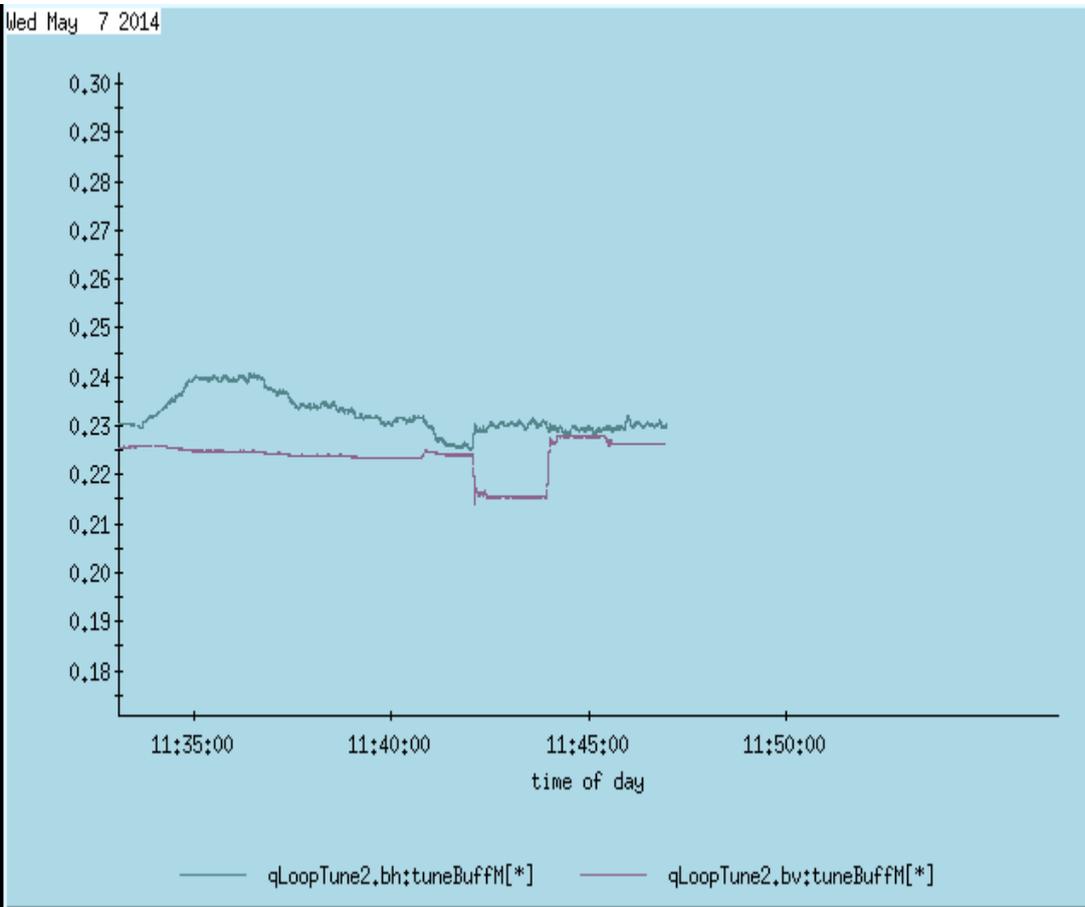
Strengths of 24 Sextupole Families

"SFP00608", "K2L",	0.462074657867436
"SFM00608", "K2L",	0.066392783532564
"SDP00608", "K2L",	-0.42345244838529
"SDM00608", "K2L",	-0.55338052601470
"SFPI0810", "K2L",	0.063829596753154
"SFMI0810", "K2L",	0.464637844646846
"SDPI0810", "K2L",	-0.65260050425744
"SDMI0810", "K2L",	-0.32423247014256
"SFP01012", "K2L",	0.00000000000000
"SFM01012", "K2L",	0.61641568175657
"SDP01012", "K2L",	-0.44587626361663
"SDM01012", "K2L",	-0.53095671078336
"SFPI1202", "K2L",	0.58706506425651
"SFMI1202", "K2L",	0.00000000
"SDPI1202", "K2L",	-0.51865318320642
"SDMI1202", "K2L",	-0.45817979119357
"SFP00204", "K2L",	0.373815915663989
"SFM00204", "K2L",	0.154651525736011
"SDP00204", "K2L",	-0.45187598735601
"SDM00204", "K2L",	-0.52495698704398
"SFPI0406", "K2L",	0.474429734762877
"SFMI0406", "K2L",	0.054037706637122
"SDPI0406", "K2L",	-0.28951186466393
"SDMI0406", "K2L",	-0.68732110973606



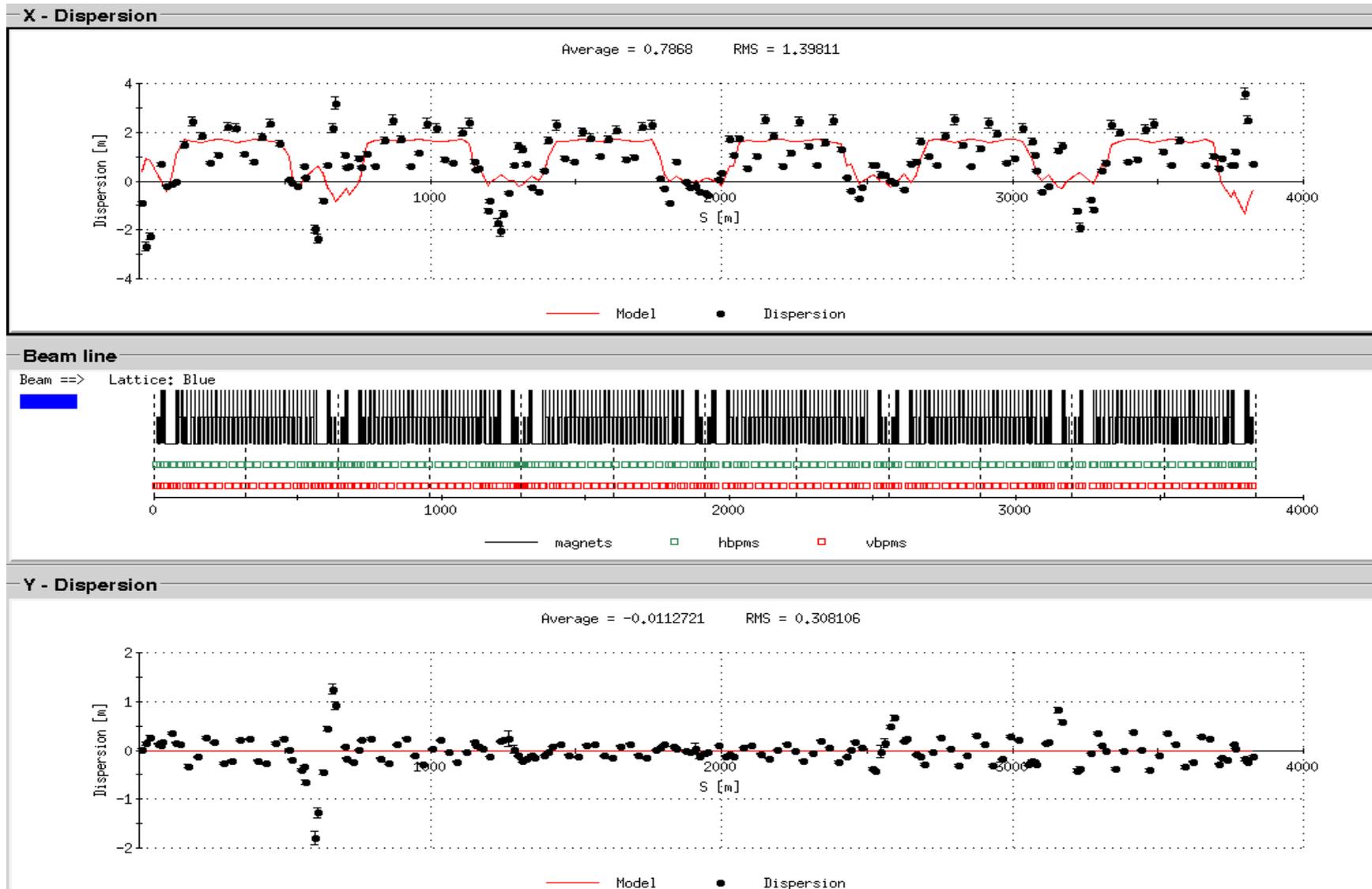
K2I max: 0.687 m^{-2}

Observations (I)



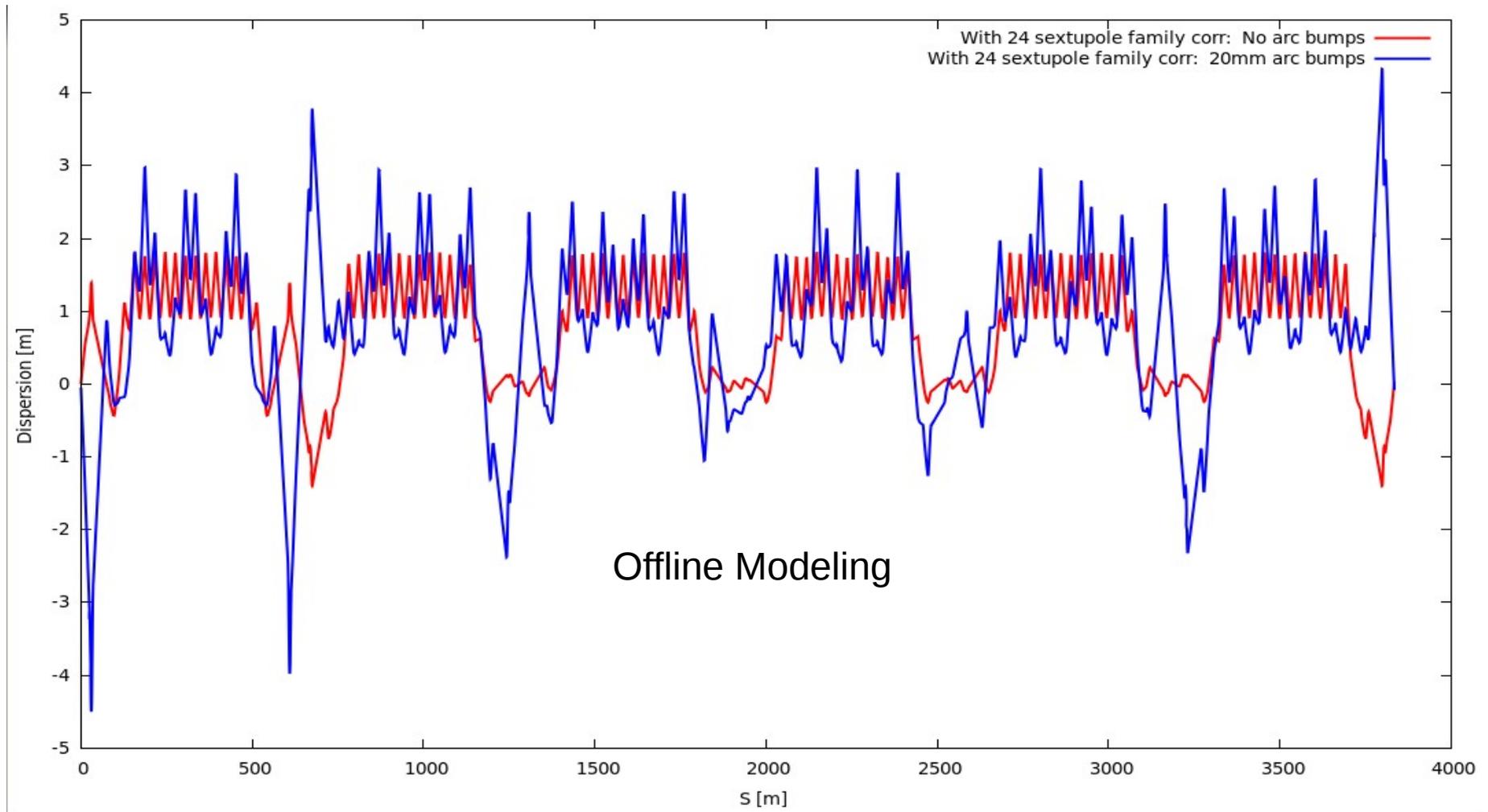
With corrections, Q_x moved up to 0.24 and X_{rms} increased by 0.14.
With tune and orbit feedback, beam lifetime recovered.

Observations (II)



After correction: $Qx' \sim 16$ and $Qy' \sim -3$.
Together with a huge dispersion deviation from model.

Explanations & Modeling



Offline modeling with real 20mm arc orbit bumps, reproduced the huge H dispersion; Also reproduced Q_x movement. Observed large D_y and large Q' changed are not shown in simulation, they may caused by coupling and other reasons.

Discussions

- 1) Reason of failed nonlinear chromaticity correction: not taking into 20mm H orbit bumps in arcs.
- 2) Observations with 24 family corrections are largely reproduced with 20mm H orbit bumps in arcs through offline modeling.
- 3) Pondering how to apply nonlinear chrom corrections with Star prefiring prevention arc bumps.

It seems to me that nonlinear chromaticity correction should be included into the lattice design phase.