

Recent Status of Emittance of ATF Damping Ring

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- Summary Report by Kubo@Sendai
- Emittance Log from JAN. to MAR. 2008
- Reliability of Emittance Measurement
- Alignment

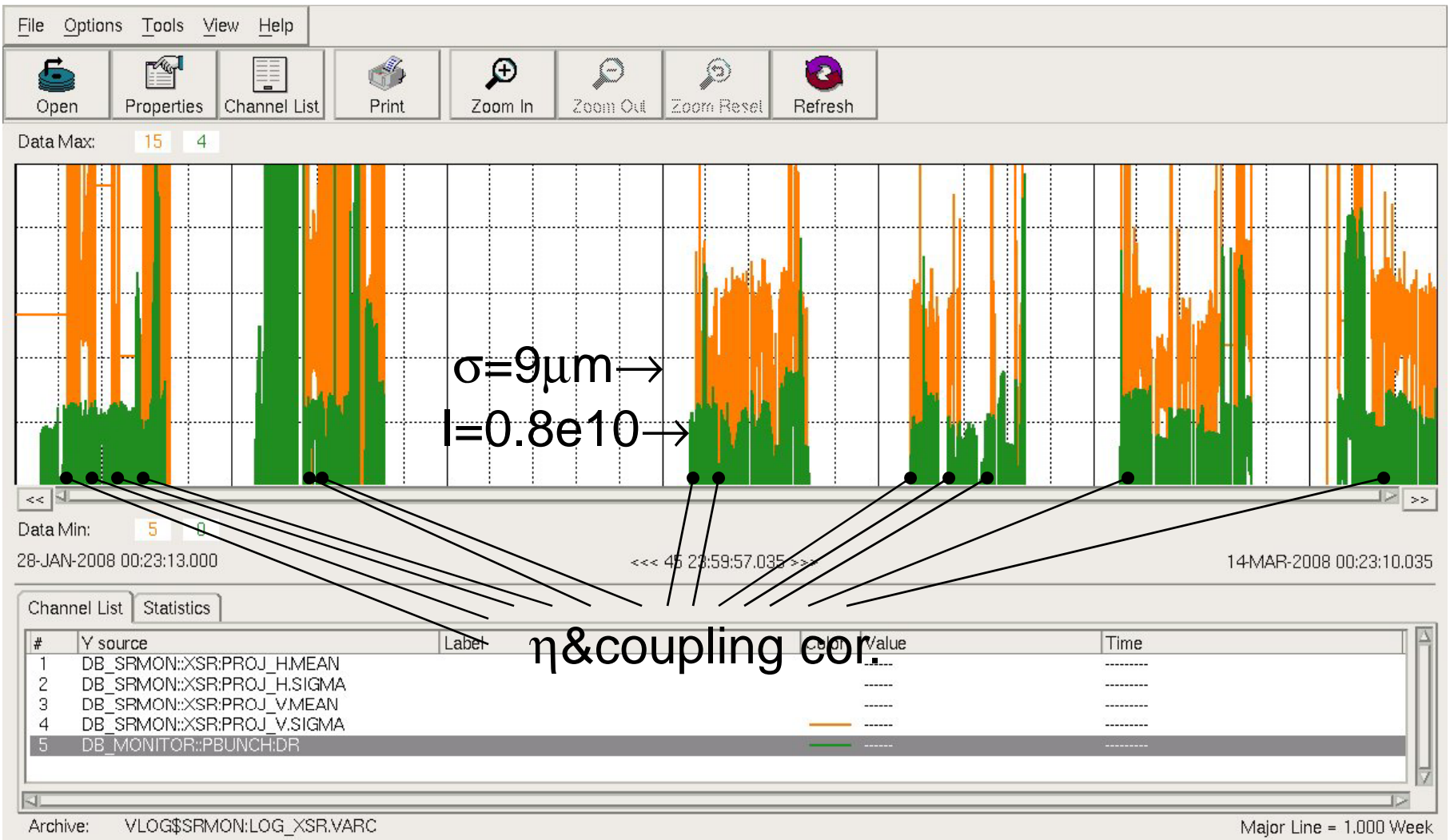
Summary Report by Kubo

- Kubo nicely summarized the recent situation of ATF DR emittance at Sendai GDE meeting 2008.
 - Vertical emittance is 20-50 μ m (by XSR measurement) in 2007-8, while it was 5 μ m (by LASER wire) in 2003
- His analysis shows vertical dispersion and coupling very large these days compared with those of 2003 when very small vertical emittance was achieved.
 - e.g. Vertical dispersion (rms) is 5mm in 2008, while 3mm in 2003
- In 2003, routine emittance tuning easily led to low emittance, but it does not these days.
- What to do for the low emittance again?
 - BBA for the new BPM
 - Optics check(Steer-BPM)
 - Realignment
 - ...?

For Low Emittance

- Since 2003, so many R&D studies in ATF and not so much effort for low emittance. But now we need small emittance for ATF2, Fast Ion study and ...
- What is the source of large emittance? No clear answer. What is the difference in machine between 2003 and 2008?
 - New BPMs, new magnets, alignment,...?
- ‘To Do’ list for the low emittance
 - BBA for the new BPM
 - Done by SLAC team, but the database is not yet updated. They will send the results soon.
 - Optics check(Steer-BPM)
 - Done last year, but no clear results. Maybe need to do it again.
 - Re-alignment
 - Measurement is done in Mar.2008, and we will decide to do/not to do.
 - And more...?

Emittance from JAN. to MAR. 2008



Reliability of Emittance Measurement

- Emittance is measured by XSR monitor these days; $\sigma_y^2 = \beta_y \varepsilon_y$
- Beam size measured is not so bad $\sim 8\mu\text{m}$. But the β_y is small $\sim 1\text{m}$ ($2.5\sim 3\text{m}$ in 2003).

β_y measurement: tune measurement changing strength of 3 Qs which was sensitive to the choice of Qs \rightarrow Changing the # of Qs to 5 made it stable and gave β_y of 3m.

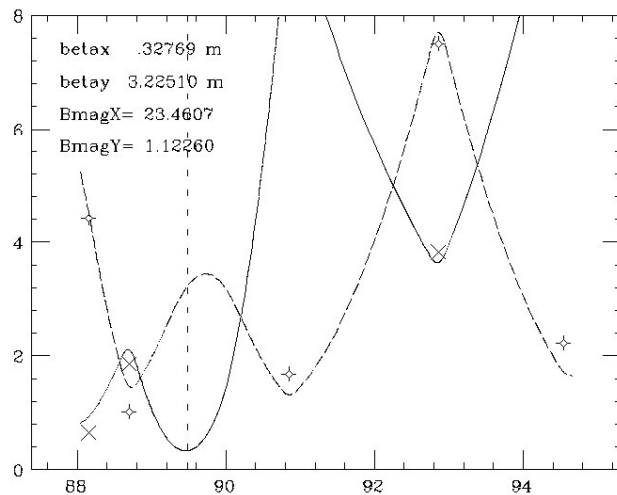
History of β measurement

- — Struggling with new optics (finally reset)

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- — Measurement with 5 Qs

Reliability of Emittance Measurement(2)



Results of 5 Q measurement

- Now the β_y can be believed to be 3m.
- Measurement is consistent with that of interferometer; the beam size and β_y measured are almost the same. Need to check the consistency with LW?
 - Done, but then the b measurement used 3Qs.
- XSR beam size includes 50Hz orbit oscillation, $\sigma_{50\text{Hz}} \sim 4\mu\text{m}$.
 - When σ_{XSR} with 20ms exposure time is $9\mu\text{m}$, σ_{XSR} with 1ms is $8\mu\text{m}$.
- What is the smallest beam size which can be measured by XSR monitor?

Alignment of DR

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Preliminary

RMS of errors

Level in 2008
by M.Takano

- Alignment errors seems to be worse now.
- Strange level change in west arc.
 - Measurement again this week.
- Decision for re-alignment next week.

Summary

- Nowadays DR emittance is large as 20~30pm.
- Need to make it small as <10pm.
 - To 10pm: BBA, Optics check, Re-alignment,...
 - To <10pm: need LW/new measurement of emittance or new optics with high β at XSR?
- Contribution to the effort is very much welcome.