Experience with Mirror Tunes

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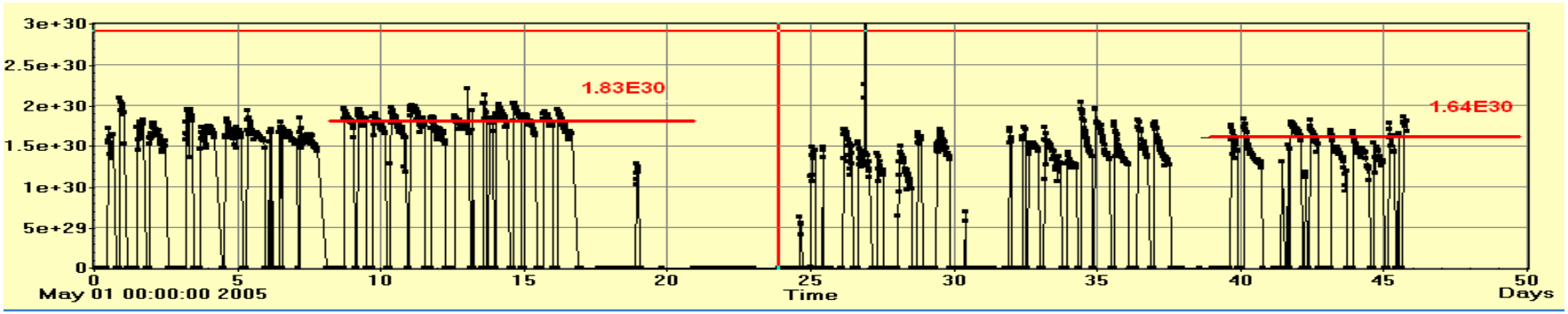
Chronology

May 25	switch to mirror tunes
May 31-June1	tune-up beam optics
June 2-6	Mirror Tune operation, polarization tune-up
June 8	Maintenance
June 9	switch to 150 Bunch operation, working point optimizations, polarization tune-up

Mirror Tune Specific Luminosity

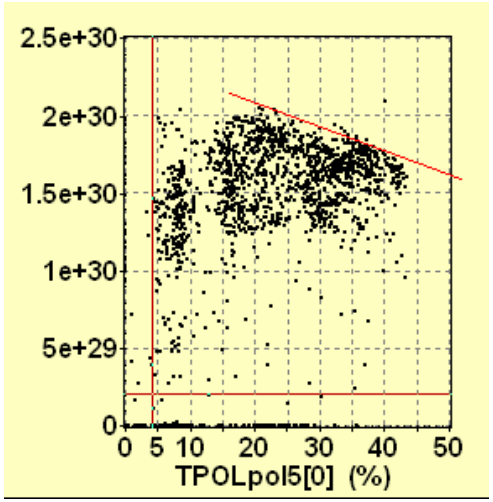


Ratio of average specific luminosity May 8-18 / June 10-16 = 1.11

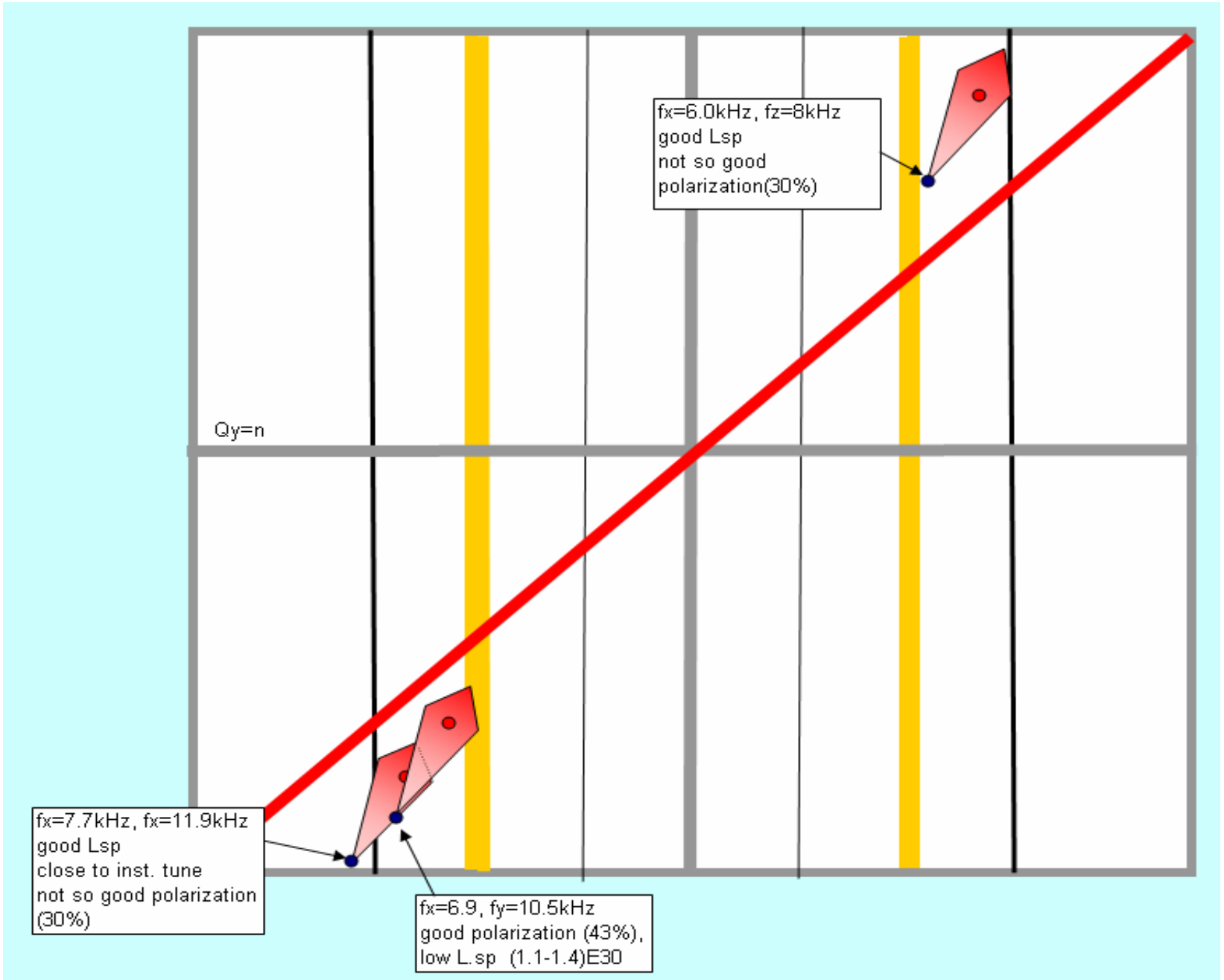
The specific luminosity with mirror tunes reaches for tune values at the end of the window values close to regular tunes. Strong decay of specific luminosity also can be slowed down with extreme tunes

on average

It is 10% below



High spec. luminosity and high polarization seem anti correlated


fx=6.0kHz, fz=8kHz
good Lsp
not so good
polarization(30%)
Qy=n
fx=7.7kHz, fx=11.9kHz
good Lsp
close to inst. tune
not so good polarization
(30%)
fx=6.9, fy=10.5kHz
good polarization (43%),
low L.sp (1.1-1.4)E30

Experimental Backgrounds

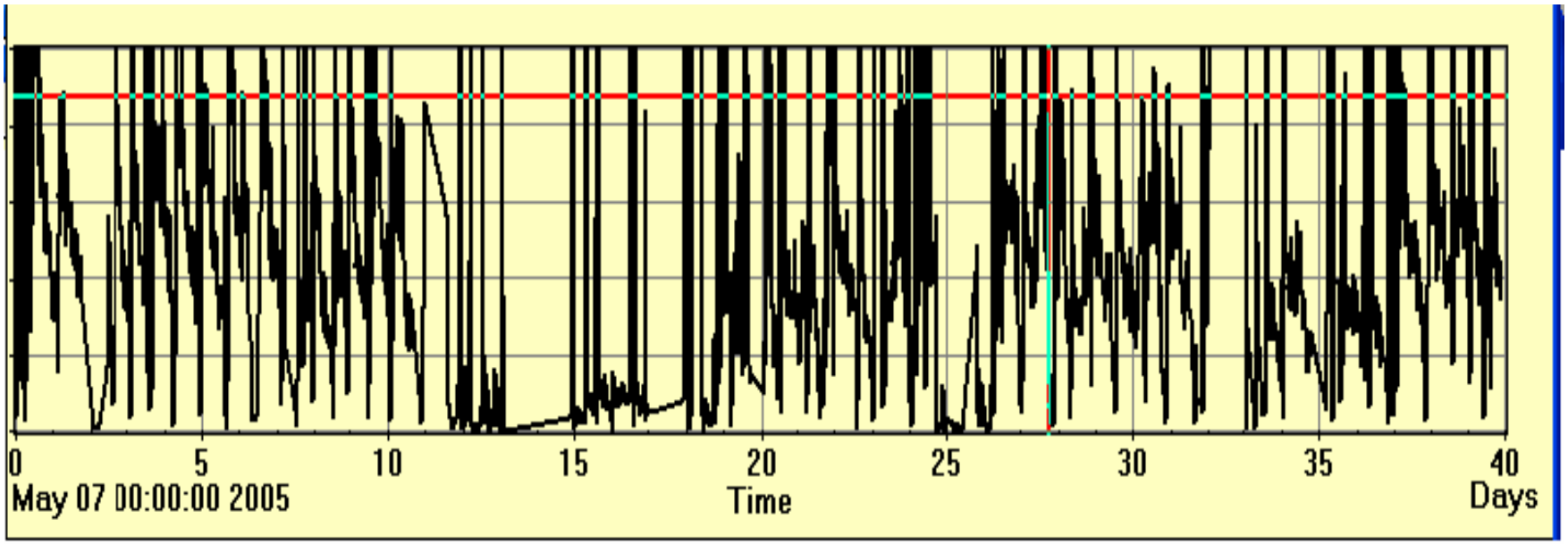
Nominal tunes

Ip=90mA, Ie+36mA

ZEUS C5

Mirror tunes

Ip=80mA, Ie=30mA



Judging from ZEUS C5: no clear disadvantage of mirror tunes,
nominal tune look somewhat more steady though

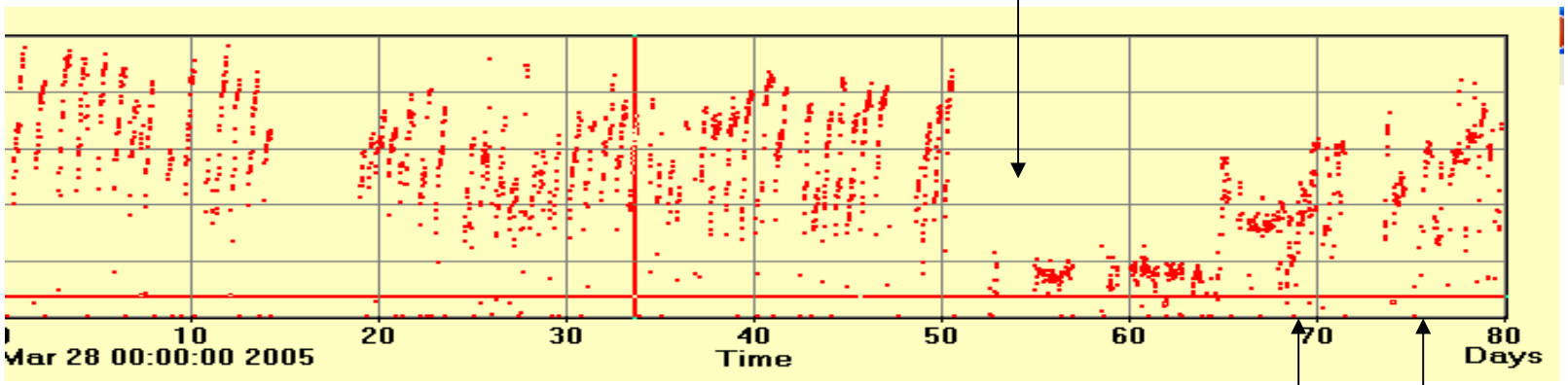
Polarization Tune-up with Mirror Tunes

Nominal tune polarization

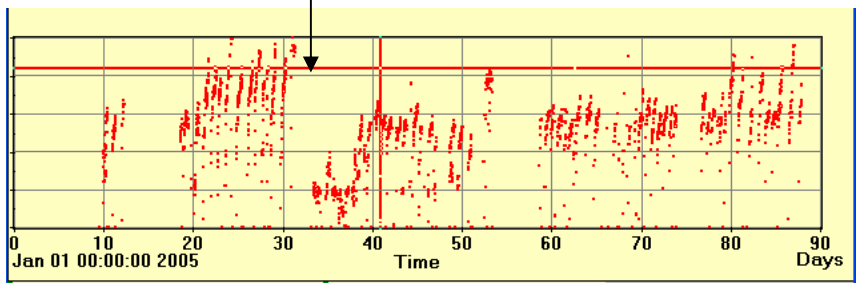
Switch to mirror tune

Switch rotator

Tune up



Tune up in February after rotator change



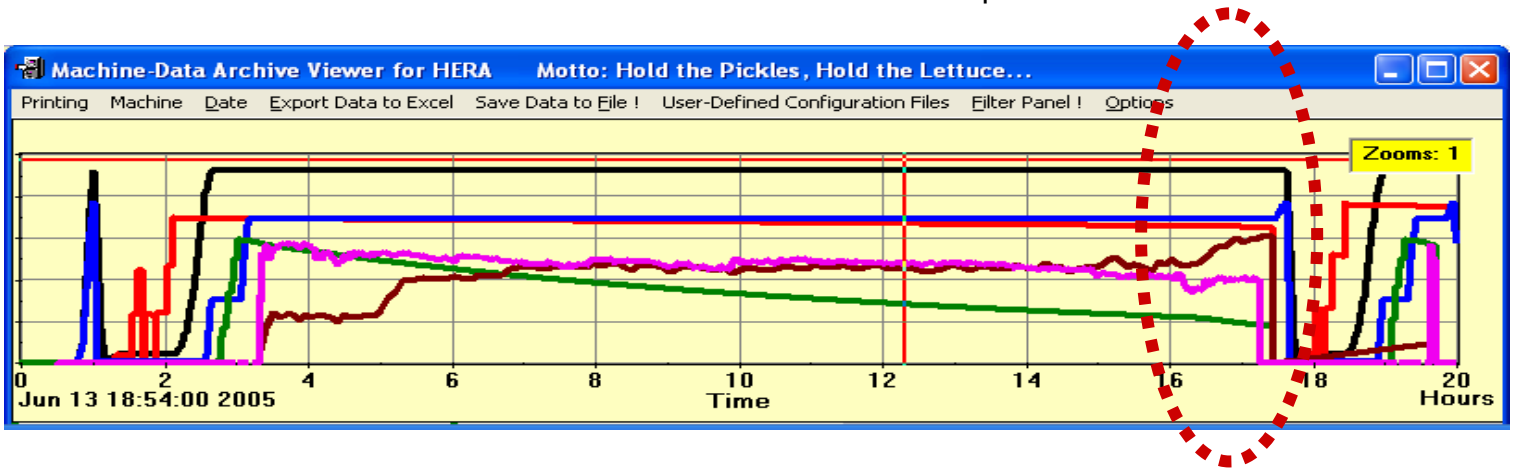
Orbit correction

Energy scan

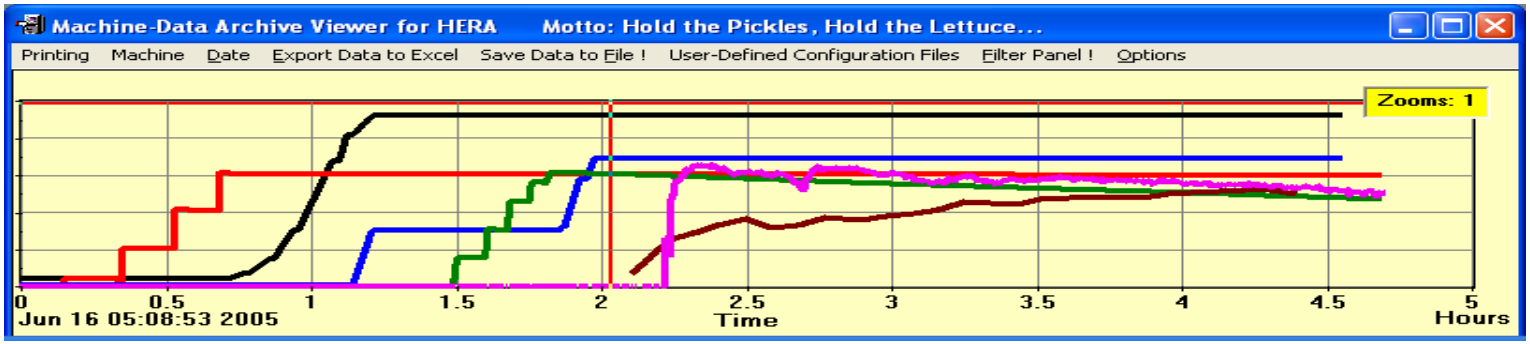
Harm.bumps

Most Recent Experience

Encouraging experiment Tuesday, June 14: good polarization (40%) with high horizontal, and low vertical tune, L_{sp} only $1.25 \cdot 10^{30}$



Encouraging: present run: Pol =36% with reasonable $L_{sp}=1.6 \cdot 10^{30}$ but with relatively low proton intensity (70mA))



Conclusions of 4 weeks of mirror tune operation

Findings:

- Luminosity somewhat lower than with nominal tune, has been steadily improving
  optimized tunes disregarding polarization gives gives ~10% L_{spec} reduction in L_{sp}
  (note: bunch intensities relatively low in both beams)

- Polarization tuning with mirror tunes normal, good start after orbit+dispersion correction

- High polarization 50% not yet achieved

- achieved Polarization (43%) at end of a run, comparable with nominal tune polarization (40%)
  but very low specific luminosity

- Experimental backgrounds ok in general

Conclusions:

Advantage of Mirror Tunes not yet materialized, possibly small reduction in luminosity

Recommendation:

Continue with mirror tunes until next rotator flip (August) (Luminosity loss ~5pb^{-1})

If polarization not significantly larger with high luminosity
➔ switch back to nominal tune
Optimize orbit and dispersion in the nominal tune optics