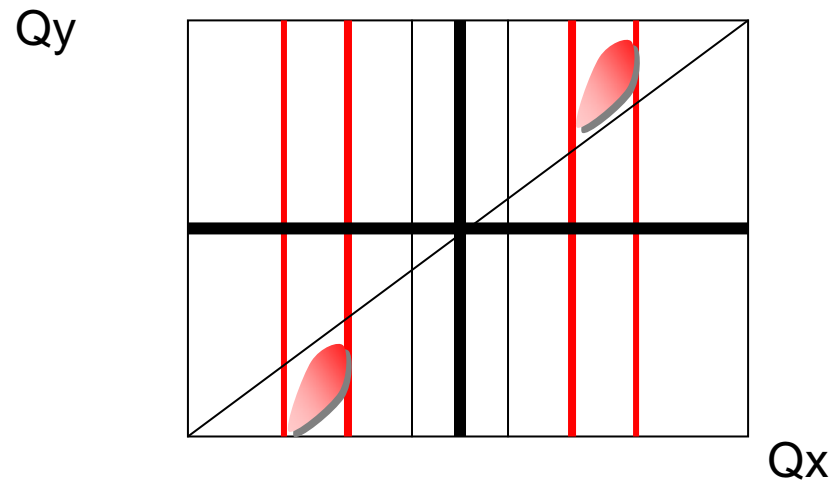


HERA Running with Mirror Tunes

F. Willeke, DESY, June 3 2005



Chronology:

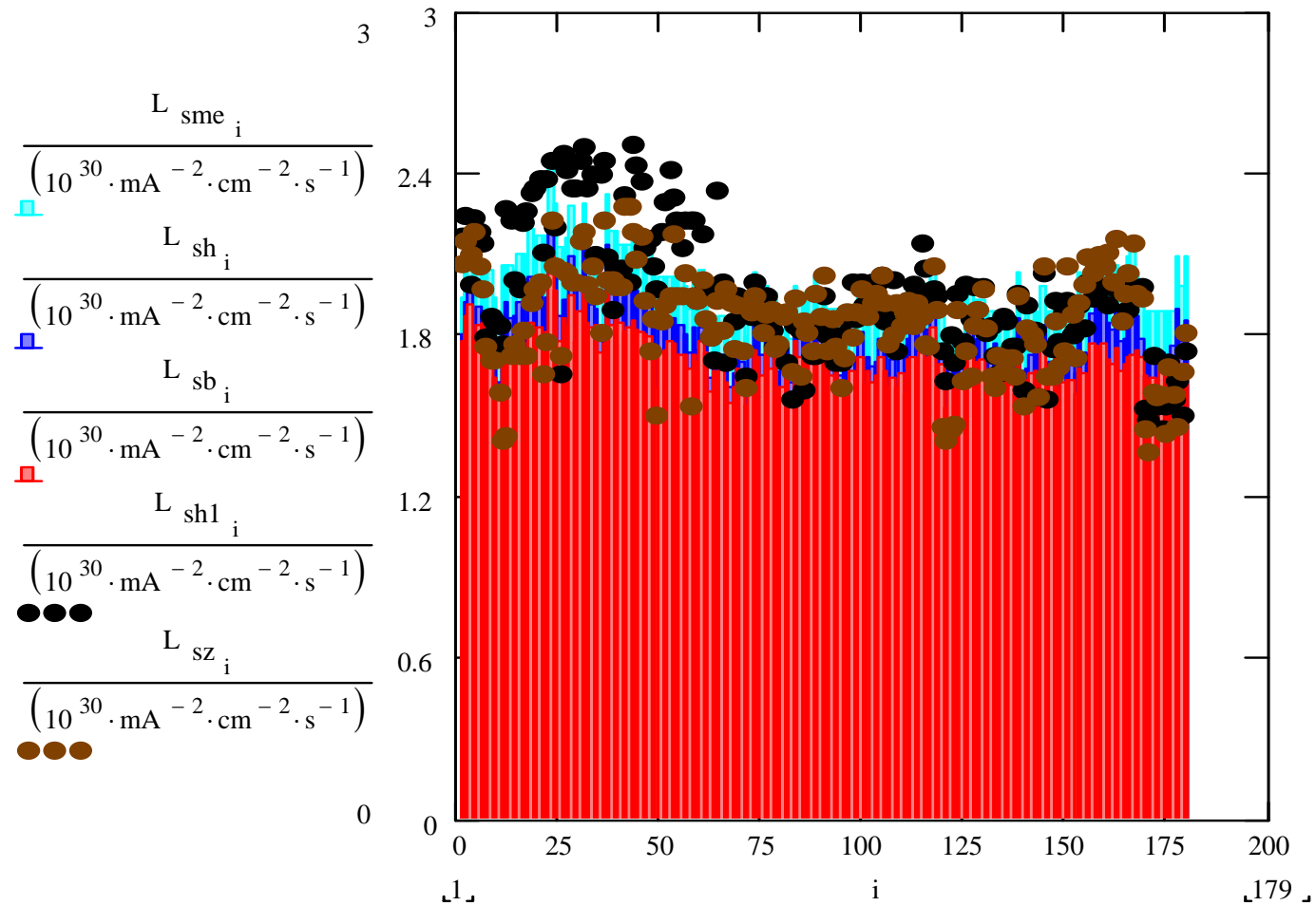
| | | |
|--------------------------------|----------------------|----------------------|
| First Tests | May 19 th | (1 short run) |
| First Setup up Routine Running | May-25-31 | (10 Luminosity Runs) |
| Further Studies | May 31-June 1 | |
| Mirror Tune Test Running | June 2-June 14 | (2 Runs so far) |

Mirror Tune Studies May 31-June 1

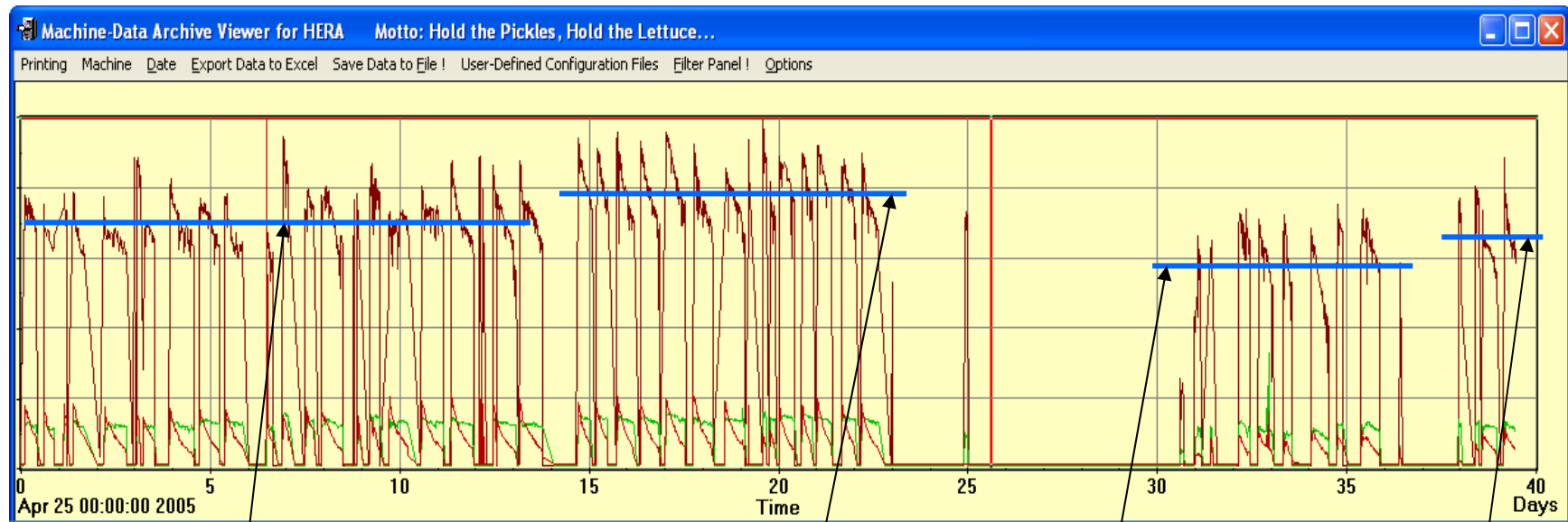
| | | |
|---|--------|---------|
| Fixing the Ramp files | 4 hr | |
| Ramp down Solenoids | 2 hr | |
| Orbit + Dispersion Correction Luminosity file | 2 hr | |
| Chromaticity measurement and correction | 2 hr | |
| Coupling Correction | 2 hr | |
| Beam Optics Check (ORM) → 30% beta beat | 3 hr | |
| Ramp Up Solenoids | 2 hr | |
| Inject accelerate protons electrons | 6 hr | |
| Correct the Optics, chromaticity, coupling | 2 hr | |
| Set Up Luminosity | 1 hr | |
| Optimize 6-D IR Orbits | 2 hr | |
| Beam Optics Check (ORM) → 10% beta beat | 3 hr | |
| Optimize IR-to-IR betatron phases | 0.5 hr | |
| Optimize Beam Ellipse Tilts | 0.5 hr | (32 hr) |

Result: peak specific luminosities of $(1.7-1.8) \cdot 10^{30} \text{mA}^{-2} \text{cm}^{-2} \text{s}^{-1}$

Specific Luminosities 2005



HERA Specific Luminosity Overview



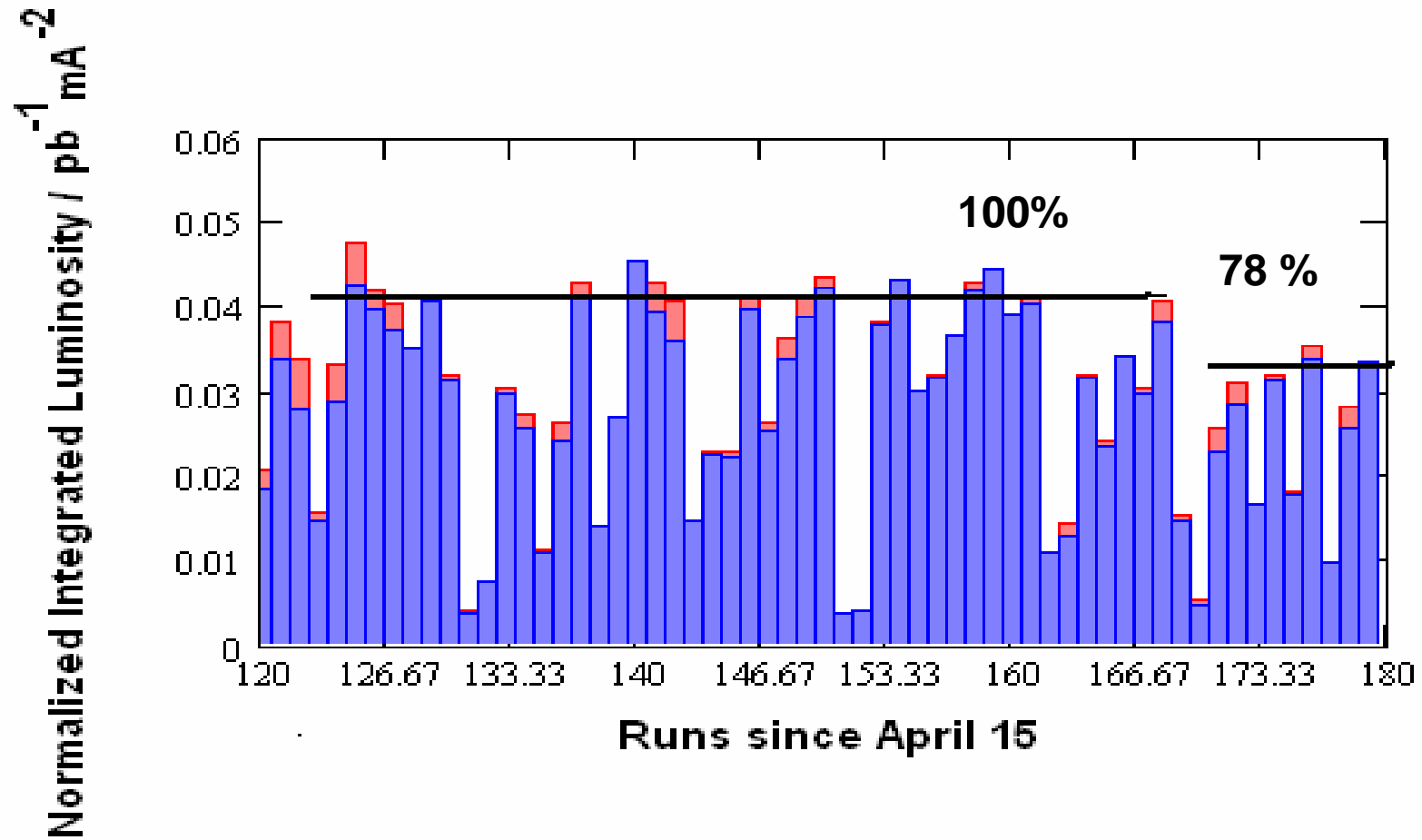
First half of May **91 %**
 Average Level
 $L_{sp} = 1.65 \cdot 10^{30} \text{mA}^{-2} \text{cm}^{-2} \text{s}^{-1}$

Third week of May
 Average Level **100 %**
 $L_{sp} = 1.8 \cdot 10^{30} \text{mA}^{-2} \text{cm}^{-2} \text{s}^{-1}$

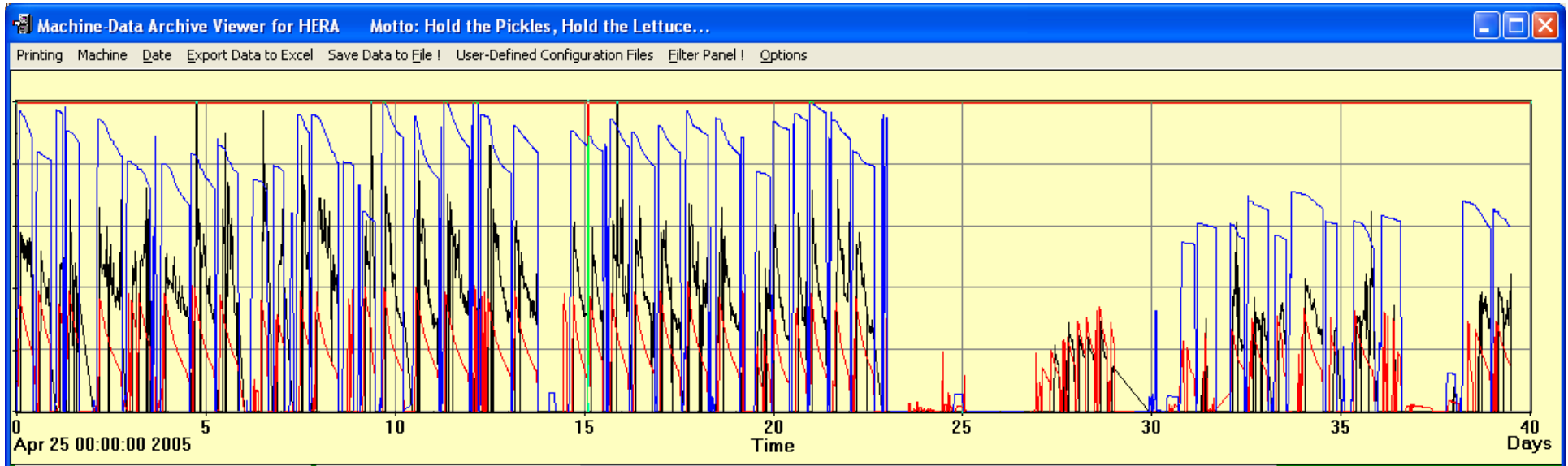
First Test Run **86%**
 Average Level
 $L_{sp} = 1.55 \cdot 10^{30} \text{mA}^{-2} \text{cm}^{-2} \text{s}^{-1}$

First Test Run
 Average Level **72 %**
 $L_{sp} = 1.3 \cdot 10^{30} \text{mA}^{-2} \text{cm}^{-2} \text{s}^{-1}$

Normalized Accumulated Luminosity since April 15



ZEUS CTD Currents



Comparison of normalized ZEUSD CTD Rates before after switch

$$\frac{\text{Average CTD Current}}{\text{Average proton Current} * \text{Average Electron Current}} = 1.45$$

Is this a significant increase?

(disregarding $I_p \rightarrow$ ratio = 1, scaling with $I_{pb} \rightarrow$ ratio = 1.16)

Preliminary Conclusions

- Mirror Tune operation can be made work with no substantial loss in efficiency
- Background conditions with mirror Tunes are not worse than with normal tunes, some indication for even better / worse conditions?
- There is presumably a 15% loss of luminosity with the mirror tunes
 - This number needs confirmation by at least one more week of running
- There is some indication that the specific luminosity decays faster
 - This also needs confirmation by some time of running