DORIS - 2 GeV Experiences in 2011

Olympus Collaboration Meeting April 27th, 2011

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Startup after the shutdown, Feb. 10th

- Starting with positrons at 4.5 GeV
- Main magnets set to theory values
- Correctors set to 2010 values and zero in RF-straight
- Empirically finding trajectory
- Passing target cell without problems
- One week of bakeout runs with current of up to 130 mA in 10 bunches

Feb. 17 th: First e^+ 2.0 GeV run

- Setting up DORIS and transport line with theoretical optic and correctors from 4.5 GeV downscaled.
- Adjusting DESY extraction energy to match transport line
- Optimize DORIS injection
- First

I max.	Uc	P-rf	lifetime
50 mA	1.1 MV	34 kW	unstable
38 mA	1.3 MV	43 kW	3 hours

Feb. 18 th: Second e+ 2.0 GeV run

- First stored beam within 1 hour after 4.5 GeV run
- Optimize feedback settings, tunes, orbit
- Switch back to 4.5GeV within 20 min.

I max.	Uc	P-rf	lifetime
36 mA	2.9 MV	56 kW	2 hours
4 runs over 6 hours with increasing target density			

Feb. 21 st: Third e+ 2.0 GeV run

- Switching between 4.5 and 2.0 GeV within 20 min.

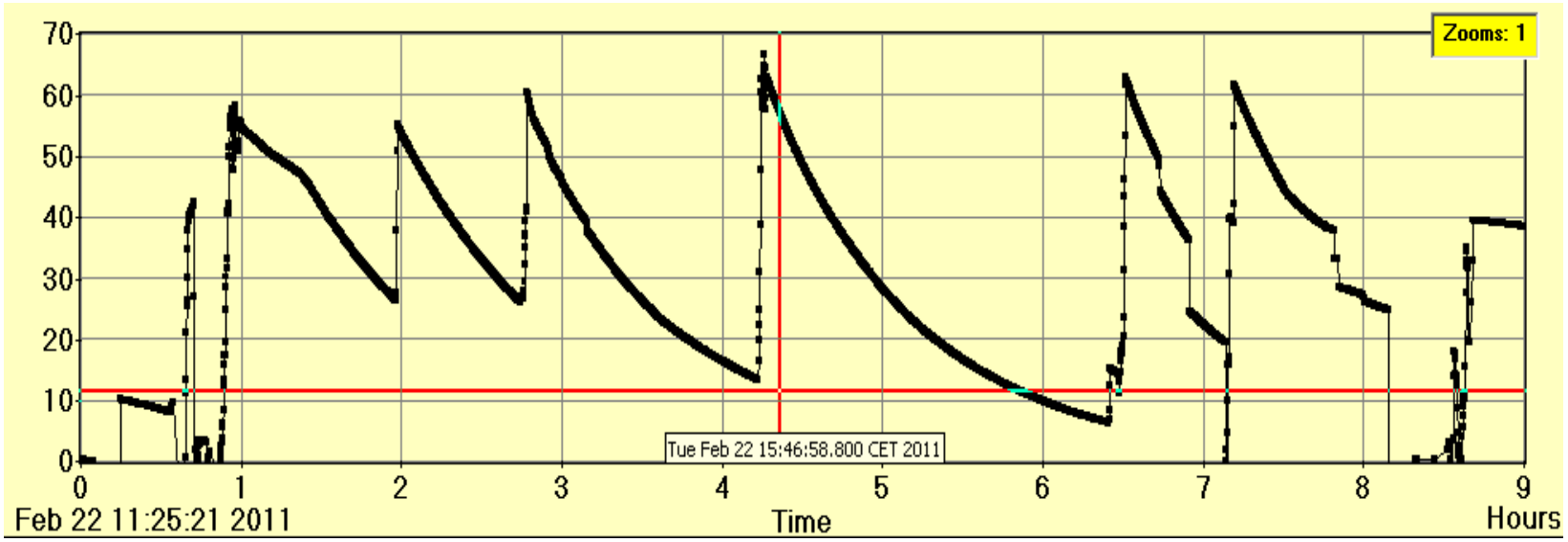
I max.	Uc	P-rf	lifetime
55 mA	2.9 MV	63 kW	1.6 hours
3 runs over 6 hours			

Feb. 22 nd: First e- 2.0 GeV run

- Just using positron files with reversed polarity
- Stored beam after 2 hours
- Switch back to 4.5GeV e^+ within 25 min.

I max.	Uc	P-rf	Lifetime (w/o gas)
62 mA	3.4 MV	93 kW	2 hours

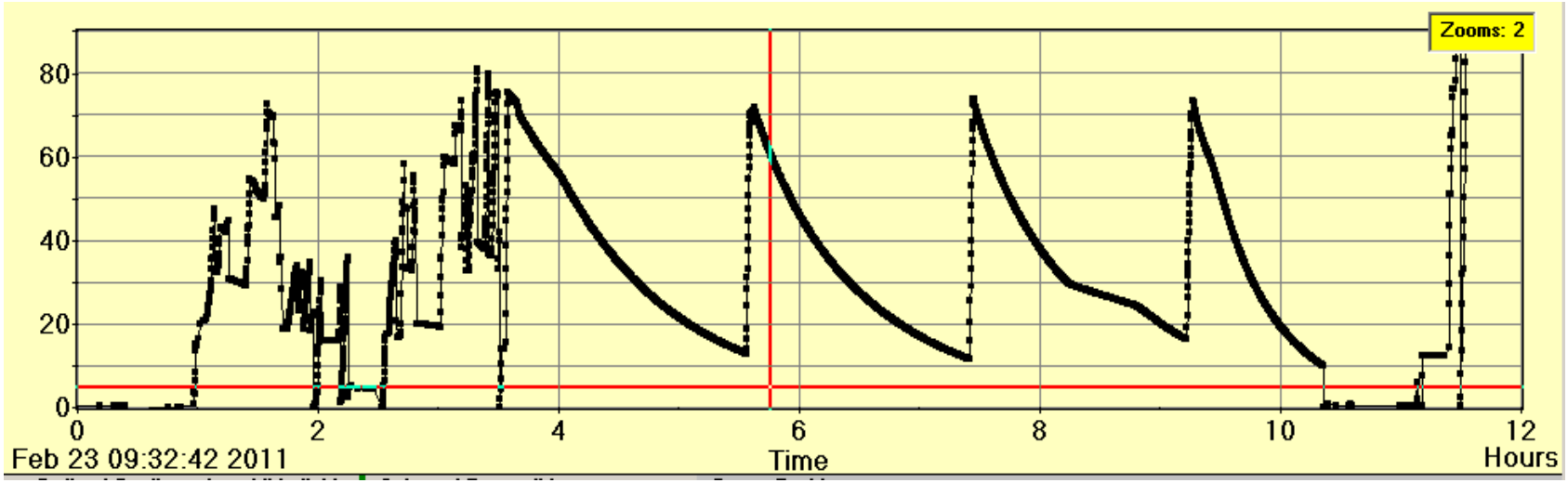
6 runs over 7 hours – no sudden lifetime drops (dust events)
Partial Beam losses due to „parameter changes “



Feb. 23 nd: 4th e+ 2.0 GeV run, RF-optimization

- Maximum current which can be filled depends strongly on RF-settings
- RF-system is optimized for 4.5 GeV runs with 8 cavities, 7.2 MV and about 800 kW of RF-power
- At the very low power needed for 2 GeV the RF-signals and Feedbacks are not reliable
- Therefore we tried to „detune“ the cavities – shift the resonance frequency away from the transmitter frequency. This reduces the quality factor and increases the needed RF-power

# Cav. detuned	Uc	P-rf	Imax	lifetime
0	2.9 MV	63 kW	46 mA	
4	2.7 MV	163 kW	54 mA	3 h
4	2.2 MV	109 kW	70 mA	6h
4	1.2 MV	85 kW	35 mA	
6	1.2 MV	160 kW	36 mA	
8	2.3 MV	330 kW	74 mA	2.3 h
4 runs within 7 hours				



- Lifetime defined by the target density down to 0.5 hours at twice the nominal density
- After that run it was decided to remove the target chamber due to the extreme temperature increases

Run during service week on April 14 th

- Switching to 2.0 GeV within 20mins. Using the files from February
- 8 Cavities detuned by defined phase (4 Cavities at the limit of tuning!)
- Long. FB working with 2 amplifiers now

I max.	Uc	P-rf	Lifetime (w/o gas)
98 mA	1.2 – 1.3 MV	160-180 kW	temp. losses
84 mA	1.2 – 1.3 MV	160-180 kW	4 hours,

→ Lower cavity voltage also means longer bunches and less transient heating …

Summary

- The new Olympus optic could easily be established and workes well also for the synchrotron light users
- Longitudinal instablities limit the max. stable beam current at 2.0 GeV (no other limits observed so far)
- Obviously the RF detectors and RF-feedback loops are off their limits
- Detuning of the cavities and thus increasing the RF-power significantly increases the current limit
- Over 7 hours none of the famous „dust events“ could be observed with electrons