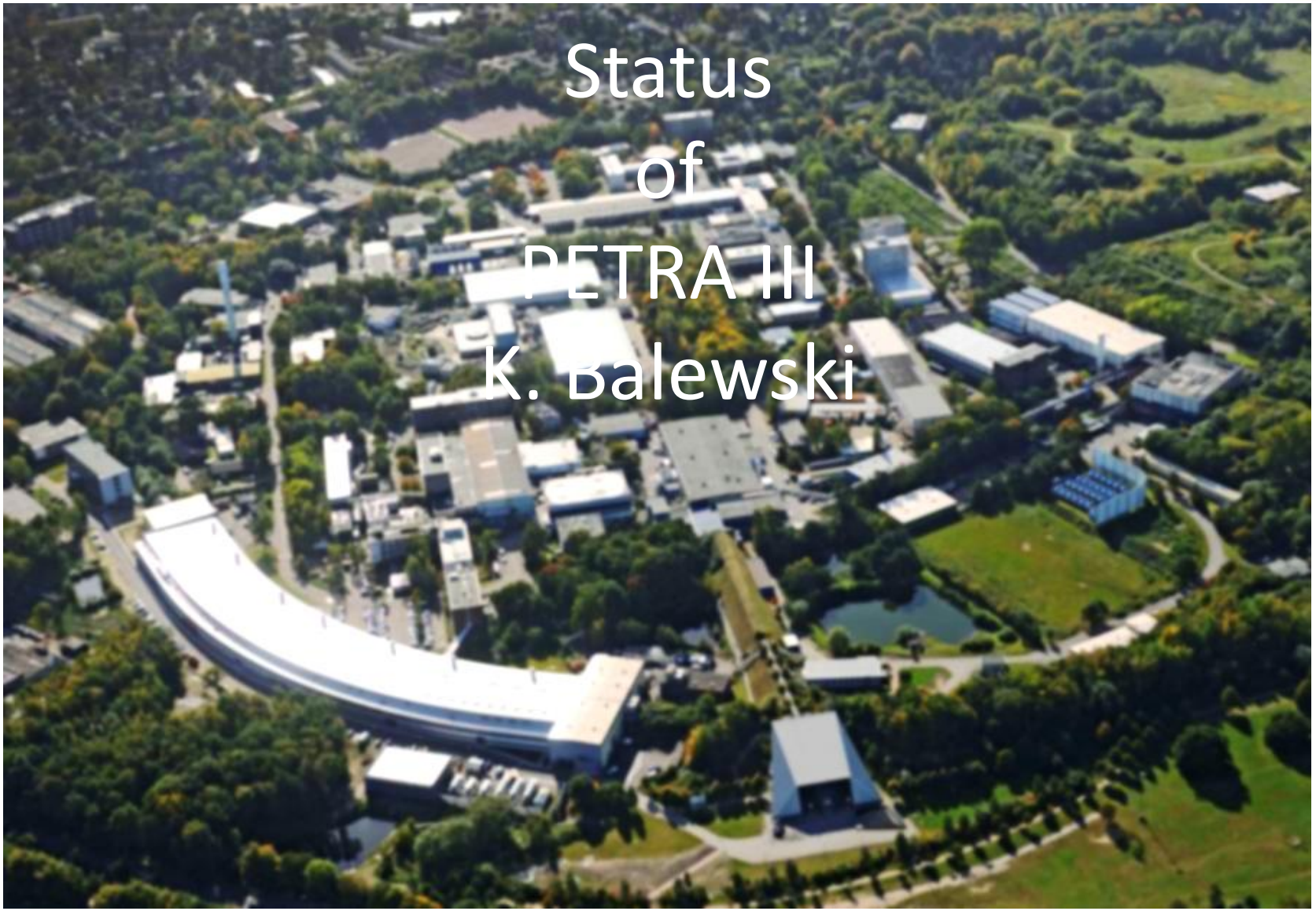
HELMHOLTZ GEMEINSCHAFT

DESY



Status of PETRA III

K. Balewski

Outline

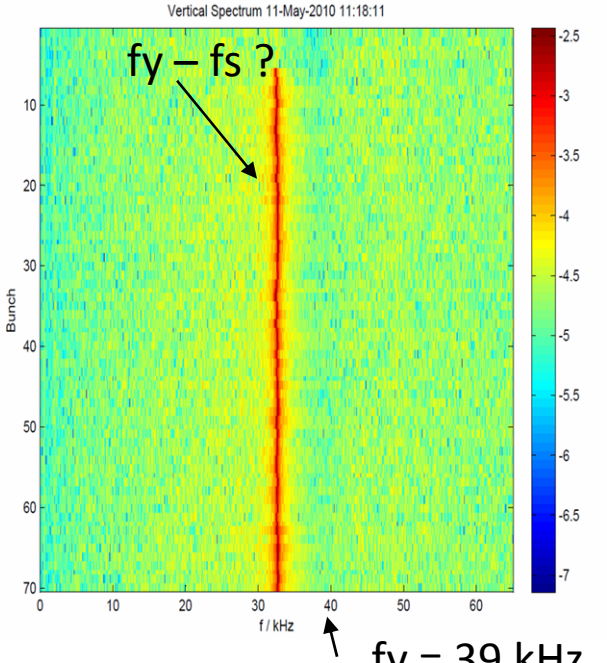
- Status
  - Design Parameter
  - Status of ID‘s
  - Operation
    - Schedule
    - Organisation
    - Availability
- PIII Extension

Design Parameters

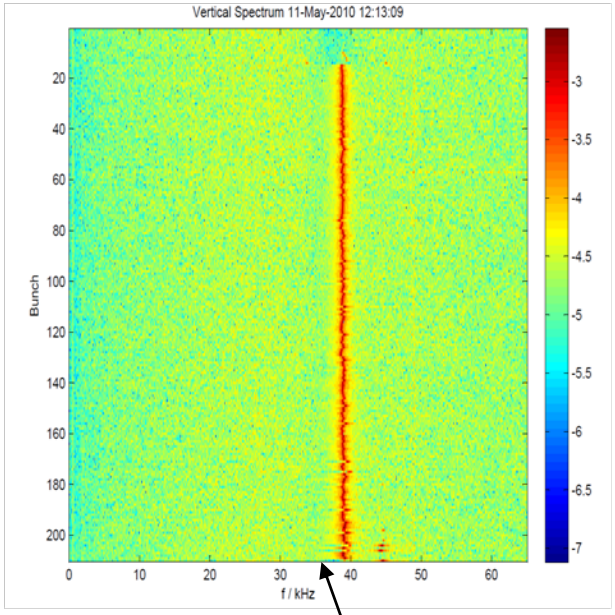
Parameter		Design	Acchieved	Comments
Energy (GeV)		6	6	ok
emittance (nm rad)	hor	1	1	ok
	ver.	0.01	≤ 0.035	Contradicting results from different measurements; work in progress
current (mA)	40 - 80 Bunches	100	70	Problems with rf – fingers and Vertical blow up for currents larger than 50 mA
	240 - 960 Bunches	100	100	Ok but (60 x4 Bunch filling because of e-cloud)
Orbit stability (μm)	hor	15	2.0	OK both long- and short term But reproducibility from run to run Needs improvement
	ver	0.6	0.5	

Vertical blow up (Operation with e+!)

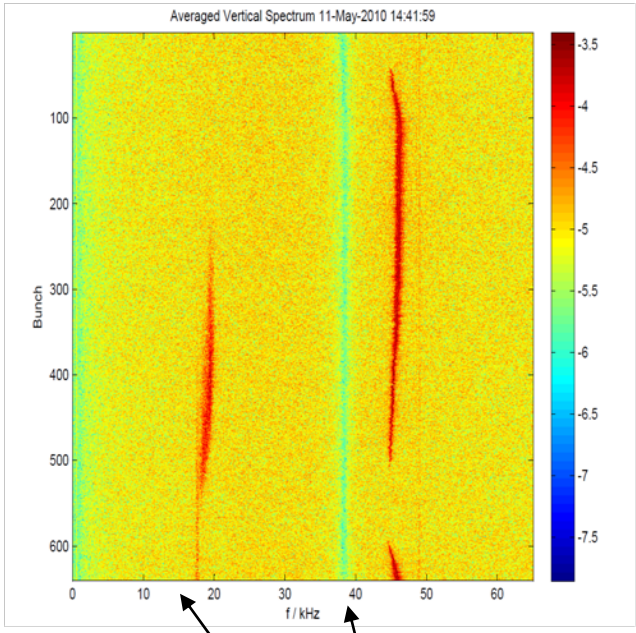
70 bunche (Δt_B=96ns)
I = 55 mA



210 bunche (Δt_B=32ns)
I = 74 mA



640 bunche (Δt_B= 8ns)
I = 64 mA



Remedy for 70 bunches:
- $\xi \rightarrow +5$
- Increase Gain of vertical feedback by a factor of 4

→ 75 mA without blow-up

e – cloud ?

Remedy: fill batches of bunches with gaps between batches (60x4 bunches)

→ 100 mA without blow-up

ID Status

Number	ID Type	Status
P01	10 m U32 (pres. 5m)	Friendly users
P02	2 m U23	
P03	2 m U29	Friendly users
P04	5 m UE65 (APPLE)	
P05	2 m U29	Friendly users
P06	2 m U32	Friendly users
P07	4 m U19 (IV) (pres. 2m)	Friendly users
P08	2 m U29	Regular users
P09	2 m U32	Regular users
P10	5 m U29	Regular users
P11	2 m U32	
P12	2 m U29	
P13	2 m U29 (installation on 1.12)	
P14	2 m U29	

High β_x : β_x = 20m , β_y = 4m
Low β_x : β_x = 1m , β_y = 4m

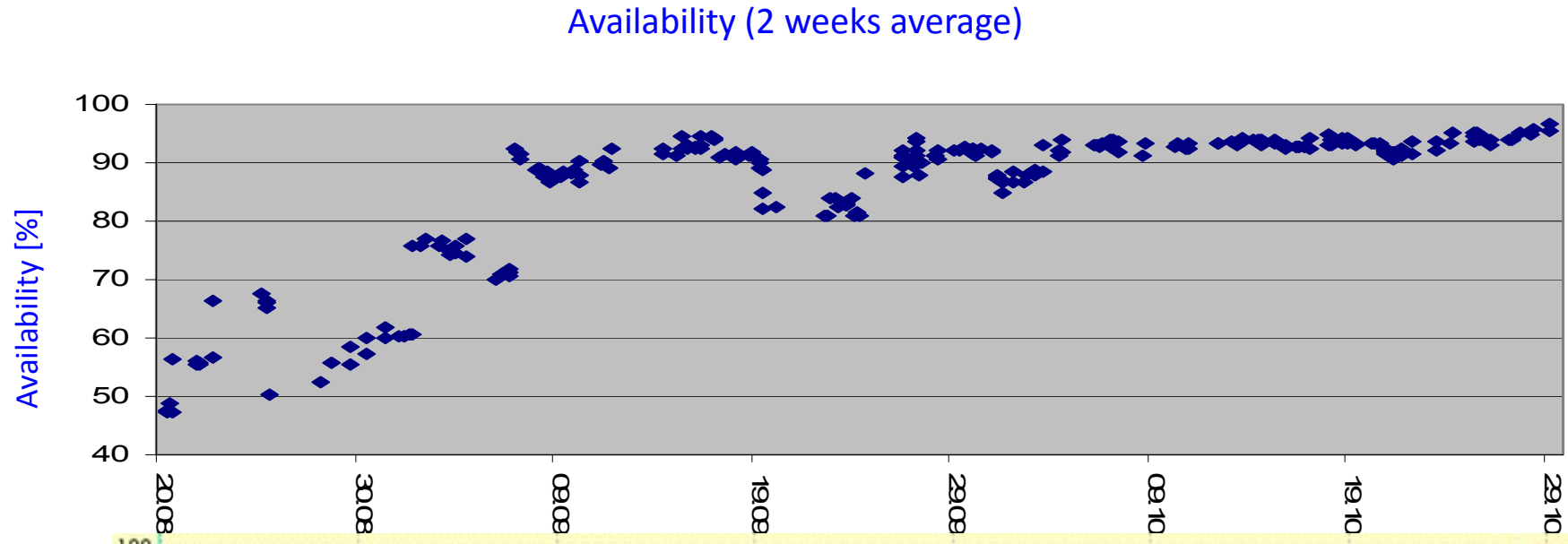
First external users in September 2010.

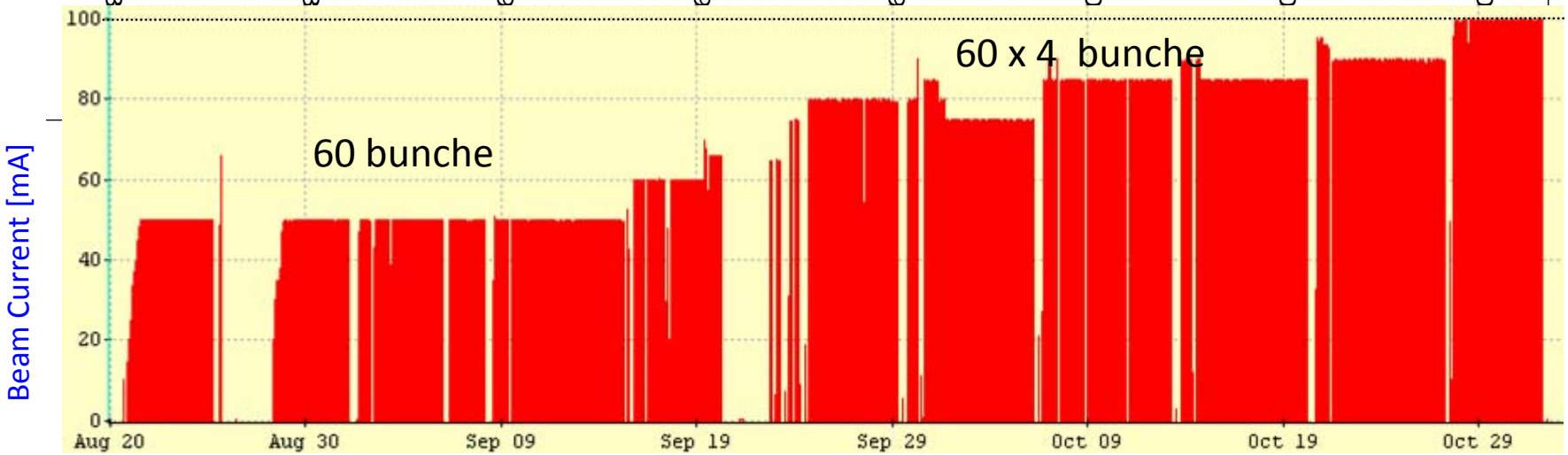
From a total of 54 applications for beam time, 32 scientific workgroups were selected in an international peer review process.

ID types

	U29_5m	U29	U32	U23	UE65 *	U19	U32_10m
Minimum magnetic gap [mm]	9.5	9.5	9.5	9.5	11.0	7.0	12.5
Period length λ_U [mm]	29	29	31.4	23	65.6	19	31.4
Length L [m]	5	2	2	2	5	4	10
Periods	169	66	60	84	72	204	2x 156
Peak field B_0 [T]	0.81	0.81	0.91	0.61	1.03	0.7	0.68
Deflection parameter K_{max}	2.2	2.2	2.7	1.3	6.3	1.24	2.0
1st Harmonic E_1 [keV]	3.5	3.5	2.4	8.0	0.3	10.2	3.6
Total power P_{tot} [kW]	7.5	3.0	3.8	1.7	11.8	4.5	10.7
On-axis power density [kW/mrad^2]	190	76	80	71	0.17	200	300
Power in 1x1mm^2 at 40m [W]	119	47	49	44	0.1	122	185
High-β source (10keV)	size : 140 x 5.6 µm^2 divergence : 7.9 x 4.1 µrad^2						
Low-β source (10keV)	size : 36 x 6.1 µm^2 divergence : 28 x 4.0 µrad^2						

Availability 2010





Operation - Schedule2010

	August	Septembe	Oktober	November	Dezember
1		MDT			MDT
2					MDT
3					
4					
5					
6			MDT		
7					
8		MDT			MDT
9					
10				MDT	
11					
12	MDT				
13	MDT		MDT		
14	MDT				
15	MDT	MDT			MDT
16	MDT				
17	MDT			MDT	
18	MDT				
19	beamline				
20	setup		MDT		
21					
22					
23					
24				MDT	
25	MDT				
26					
27			MDT		
28					
29		MDT			
30					
31					

Machine Development Time:

3 – 4 shifts every Wednesday:
7:00 – 10:00 tunnel access
10:00 - ~ 18:00 studies
18:00 – 7:00 test run
7:00 – 14:00 studies

Service Week:

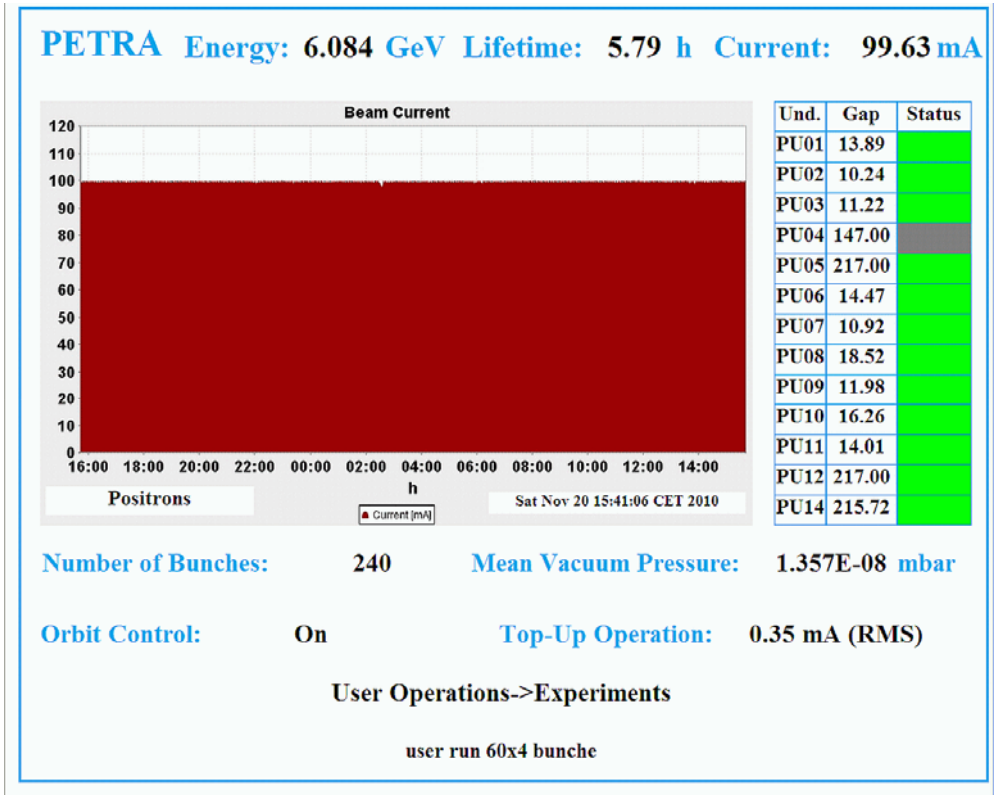
3 days open tunnel
2 days tunnel closed
2 days test run

User Operation:

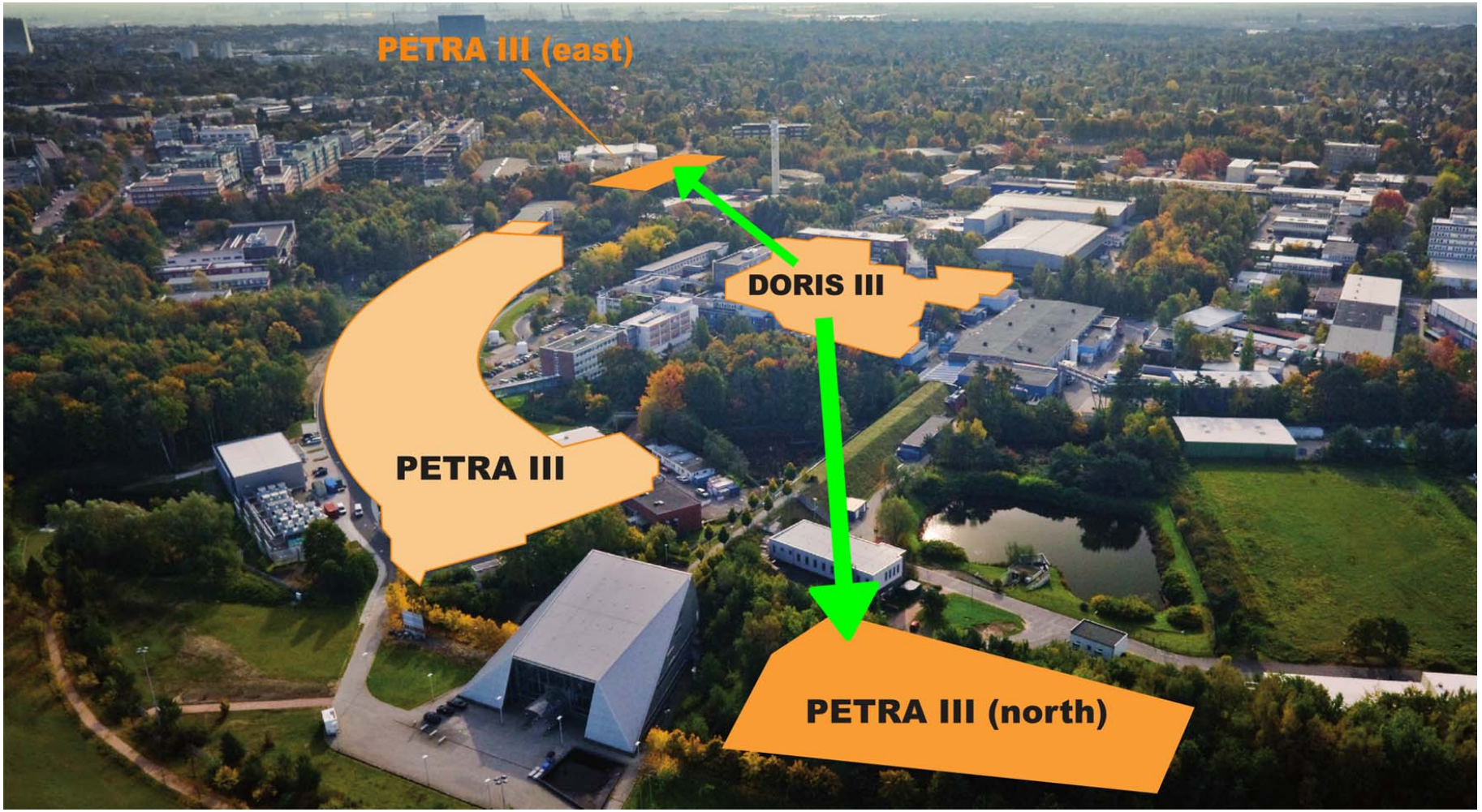
In total 86 days
or 2080 hours
(68 days peer reviewed,
18 days in house groups)

Operation

- Fully automatized top-up operation
- Routine operation done by operators
  - Setup after shutdown/maintenance or beam loss
- Machine studies done by physicists



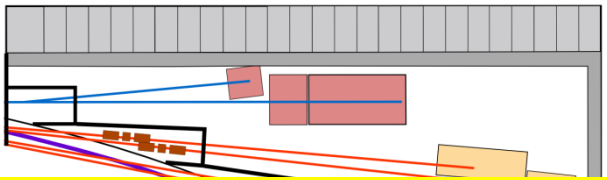
PIII – Extension
Autumn 2012 – Spring 2013



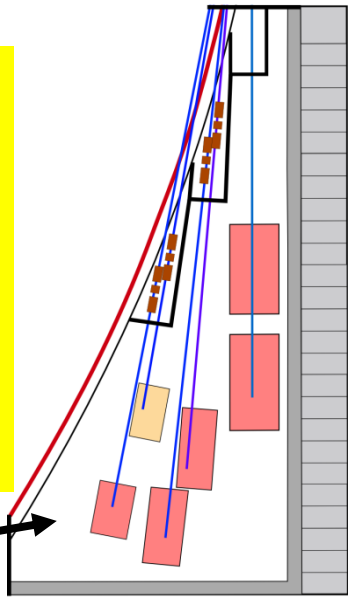
PIII – Extension
Autumn 2012 – Spring 2013

two straights plus the adjacent arcs

North



East



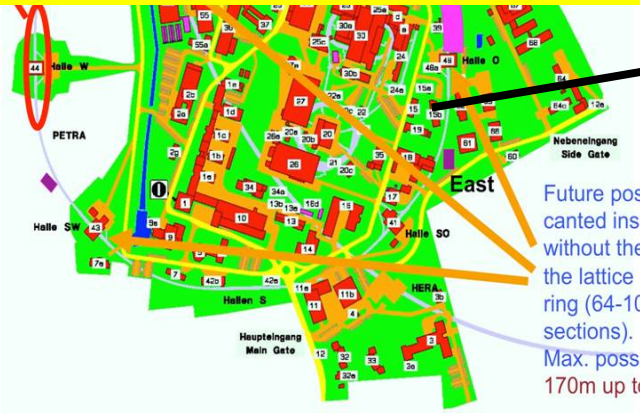
North

Damping
+ 4 additi
in the a

10 additional beam lines

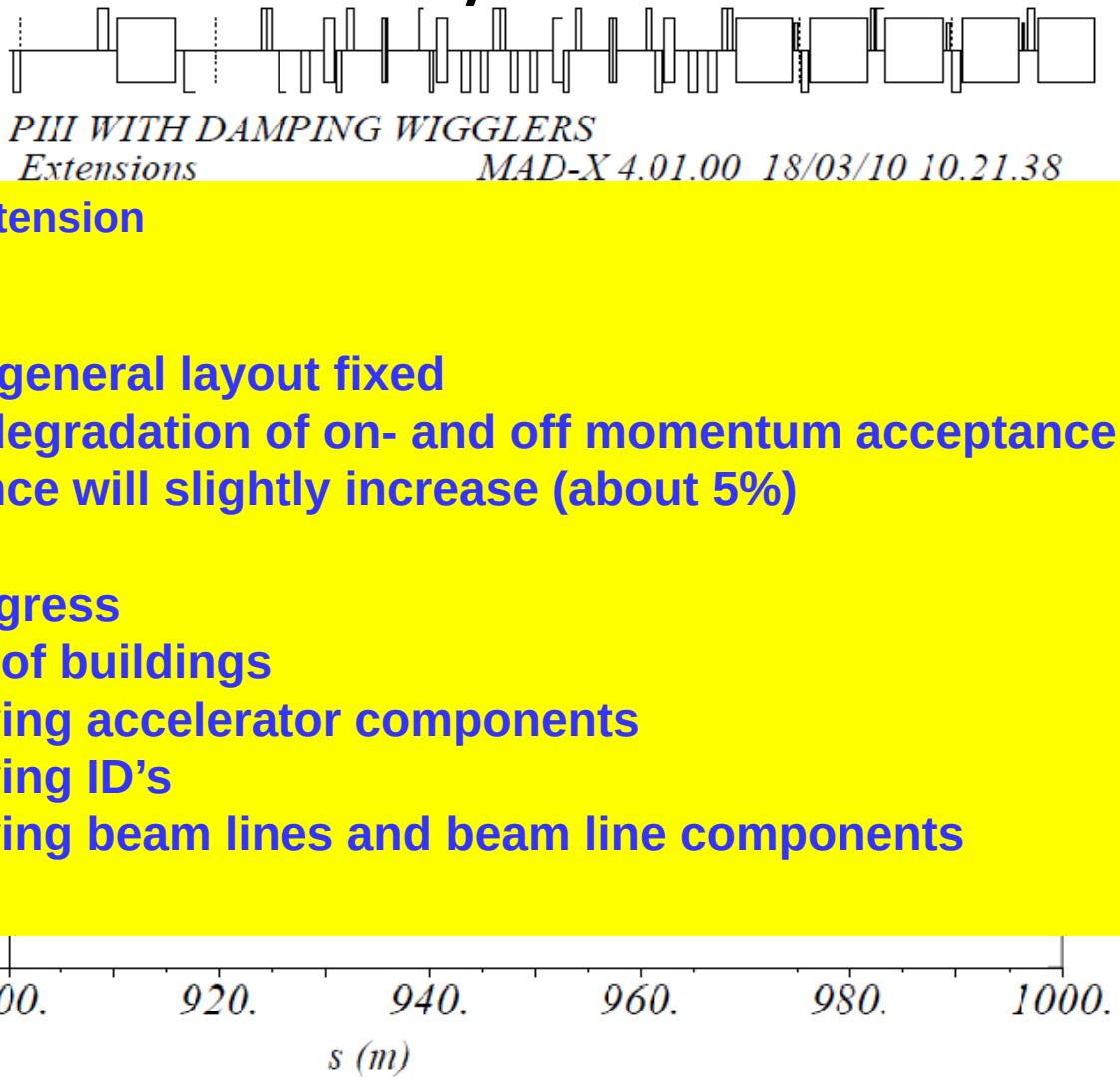
East

Long straight for IDs
+ 4 additional beamlines
in the arc (IDs + "BM")



Future positions for long or canted insertion devices without the need to change the lattice of the storage ring (64-108m long straight sections).
Max. possible BL-length: 170m up to 350 m

PIII Extension Layout



Status of PIII Extension

- **Optics and general layout fixed**
  - **Slight degradation of on- and off momentum acceptance expected**
  - **Emittance will slightly increase (about 5%)**
- **work in progress**
  1. **Layout of buildings**
  2. **Specifying accelerator components**
  3. **Specifying ID's**
  4. **Specifying beam lines and beam line components**
  5. **…**

HELMHOLTZ GEMEINSCHAFT

DESY

Thank you
for your attention

Orbit Stability