

ANKA Status Report

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Slides courtesy of A.-S. Müller and C.Heske.

Institute for Synchrotron Radiation



Outline

- ANKA today and tomorrow
 - Science fields, construction and new beam lines

- Operation
 - Operation status and statistics

- Hardware/software
 - Moving from old to new hardware

- The future
 - super conducting insertion device development
 - Consolidation Plans

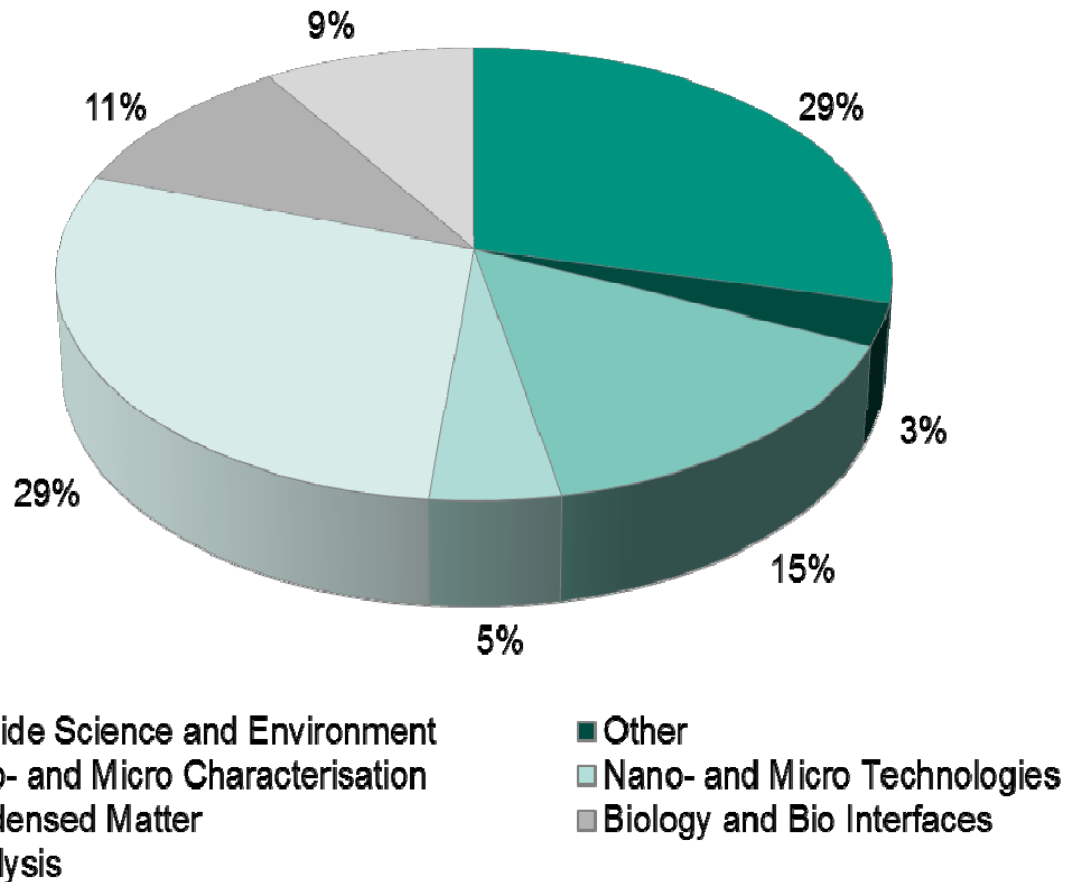
- Summary

- See tomorrows presentation by M.Schuh for some nice beam studies and diagnostic equipment.

Normal users (2.5GeV)

Other users

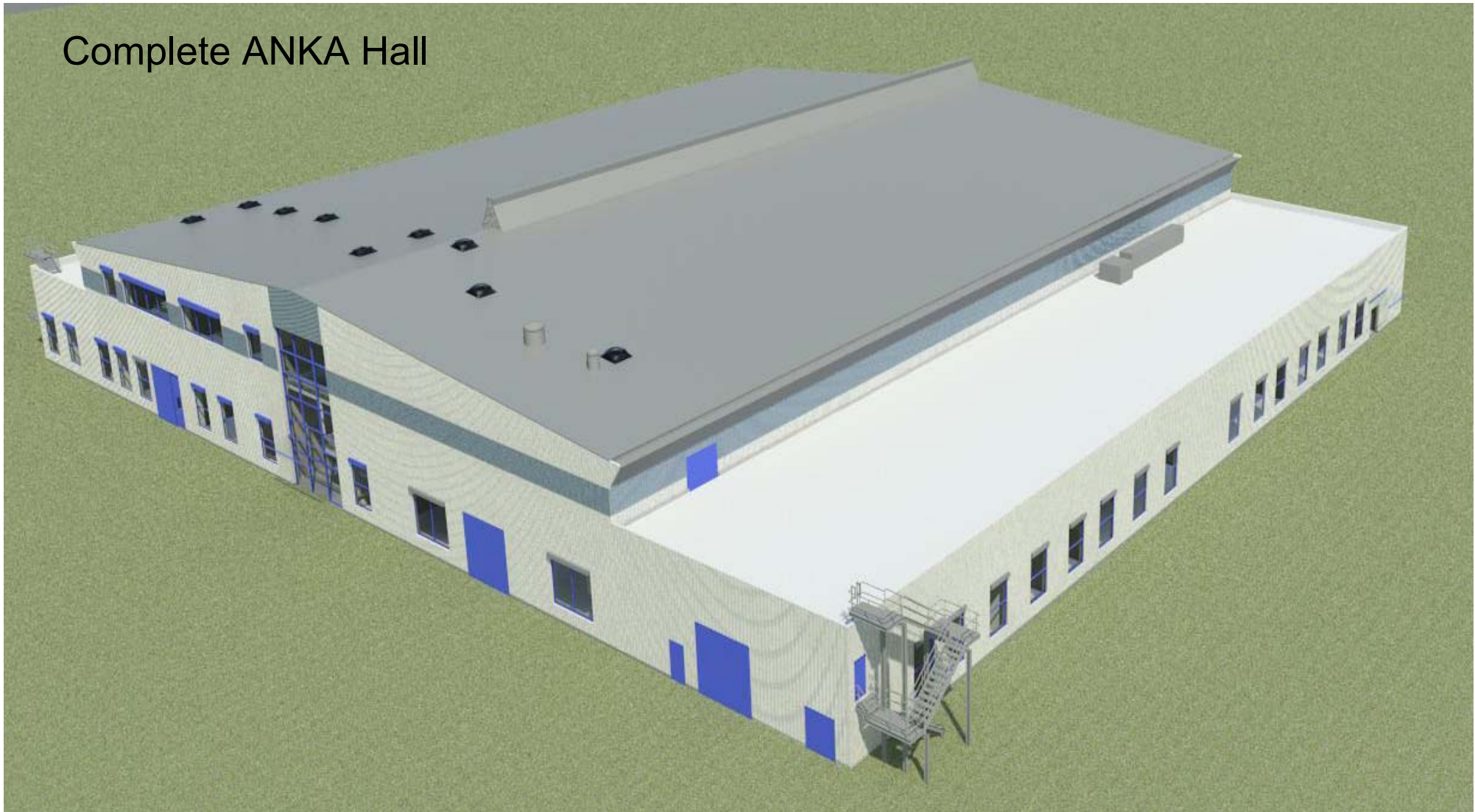
2010 scientific fields of the approved proposals



Approx 10% of machine running time is left for:
Machine studies
Single bunch
Low alpha
Low Energy

ANKA – Hall Extension Programm

Complete ANKA Hall



Reality: Construction on all sides!



North-west corner
October 12, 2011

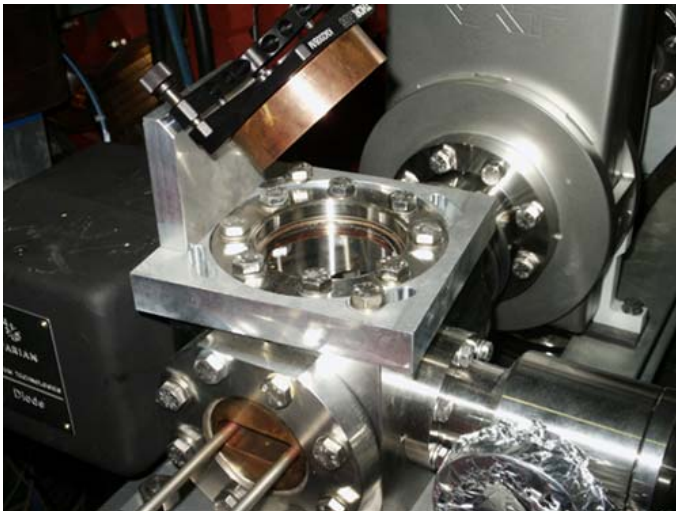


New Beamlines

- UVCD-CD12, transferred from Daresbury, now commissioned
- IR2, with nanoscope , now in commissioning
- Flute, now funded. Allow small-scale tests of THz generation, compression, radiation transport and instrumentation,...
- T-Bone, proposal for a linac-based coherent radiation source in the THz to Mid-IR range
- Image/X-MIC, twin beam line in construction
- Visible light diagnostic port proving very usefull

Visible Light Diagnostics Port

- Dedicated visible light beam diagnostics beam line operational since October 2010
- Significantly increased flux allows measurements for small currents
- Optimised for Streak camera operation



Beamtime

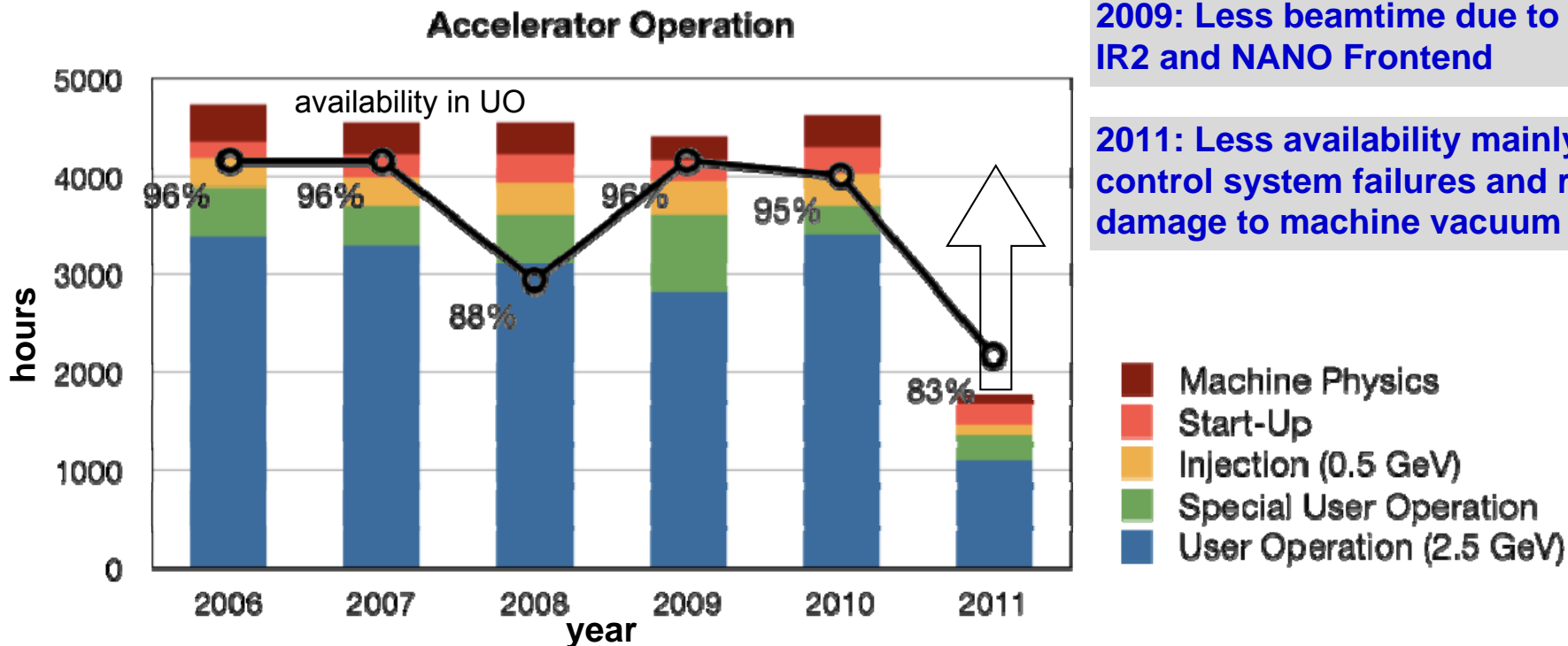
■ Storage ring operates for about 4500 h / a

- no 24/7 operation possible due to limited resources (personnel)
- several operation modes offered
- availability on average $\approx 92\%$

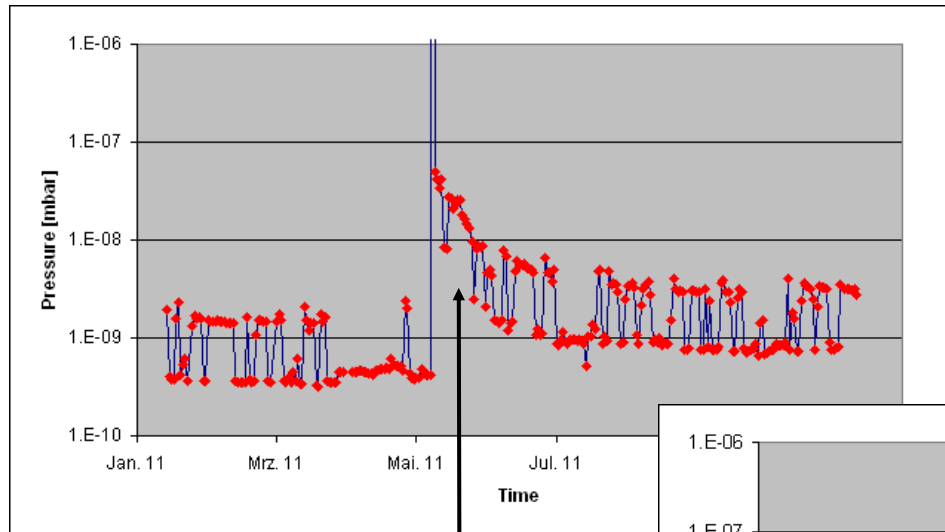
2008: Less availability due to e-gun vacuum leaks and longer start-up time (SUL-wiggler-AL-vac.-chamber)

2009: Less beamtime due to built-up of IR2 and NANO Frontend

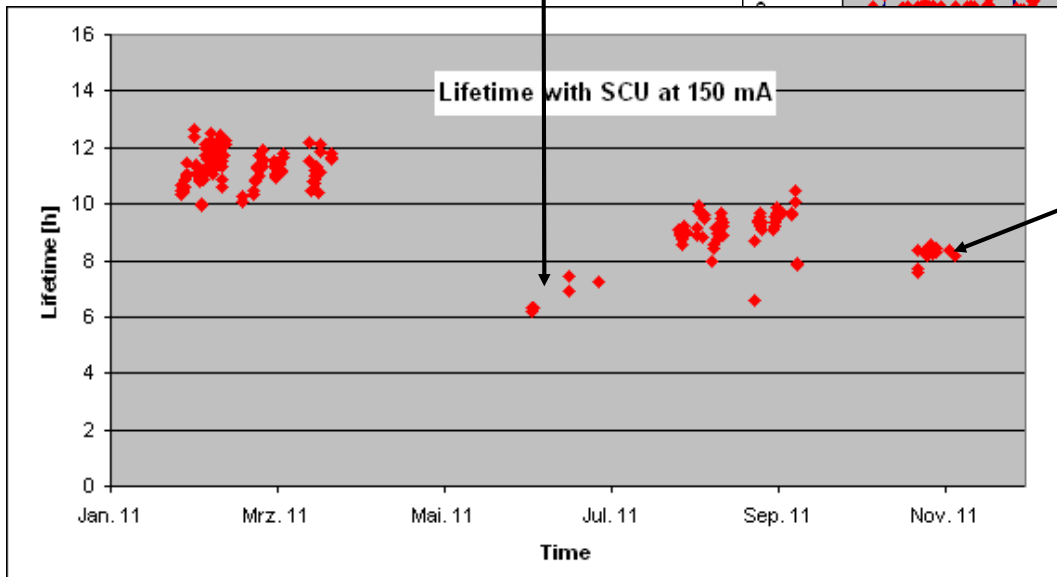
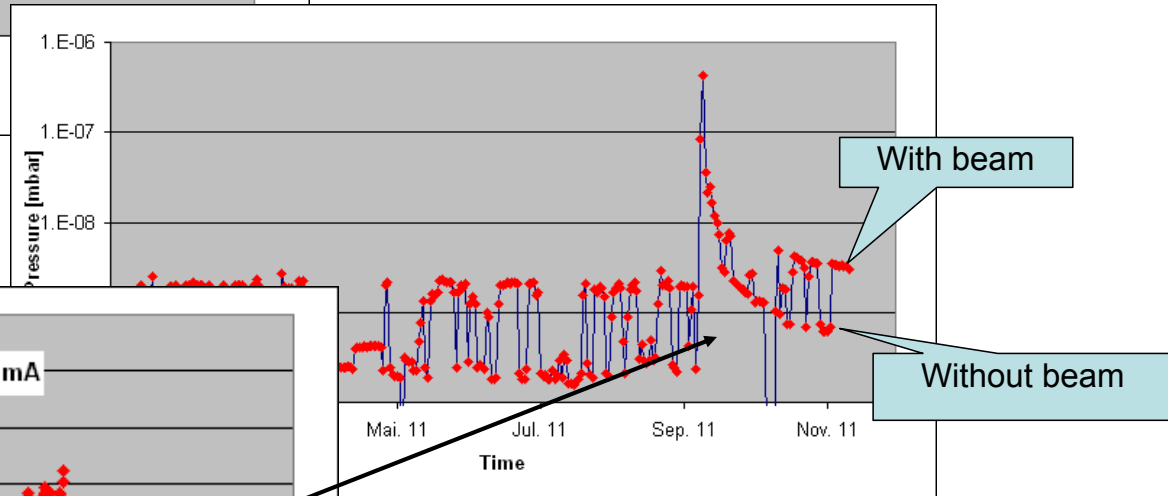
2011: Less availability mainly due to control system failures and resulting damage to machine vacuum & RF



Storage Ring Pressure & Lifetime



■ May: Control system failure caused miss-steering of e-beam, production of whisker in beam path, no turns, venting of sector 4



■ Sept.: Leak in Diagnostik front end (bellow) (first leak in SR vacuum system since 2002)

A whisker example from U139, not from ANKA

THIN METAL SHEETS IN THE FIELD OF THE U139



HELMHOLTZ
ZENTRUM BERLIN
für Materialien und Energie



„Magnetic Dust Particles in the ID Chamber“, P. Kuske, Friday 27 November 2009, Hamburg

Radio Frequency System

■ Problems and solutions in 2011

- 3 GHz preamplifier failed (replacement from BESSY, new one built up)
- 500 MHz low-level calibrated with C.Pasotti (ELETTRA)
- 500 MHz klystron input failed (cabling replaced)
- 500 MHz preamplifier failed (RFT)
- Cavity cooling failed (now digital PID regulators)



■ RF expert hired in Feb.11 (Andreas Böhm)

■ Actions

- exchange of klystron due in 2012
- implementation of RF lab
- refurbishing of components



Power Supplies

- Onset of failures since mid 2011
 - Injection kicker, MOSFET dead, but box ALIVE
 - Dipole extraction line (transistor board)
 - Dipole booster (DC overload)
 - Bumper with no spare
 - Extraction septum (HV regulation module)



■ Actions

- Successive replacement of power supplies foreseen
- Electronics expert urgently needed (position soon to be opened)

New (fast) BPM System for ANKA

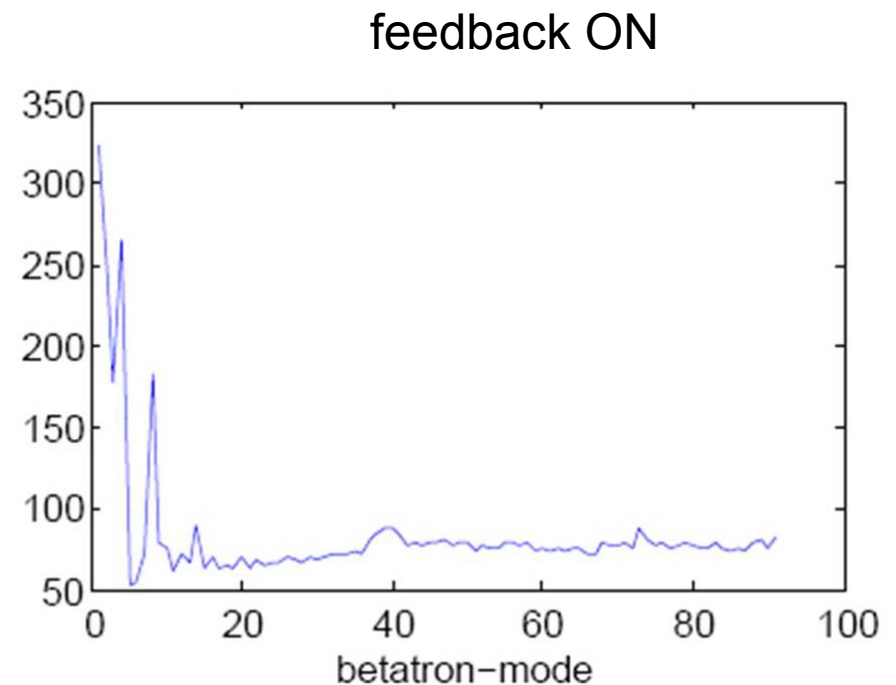
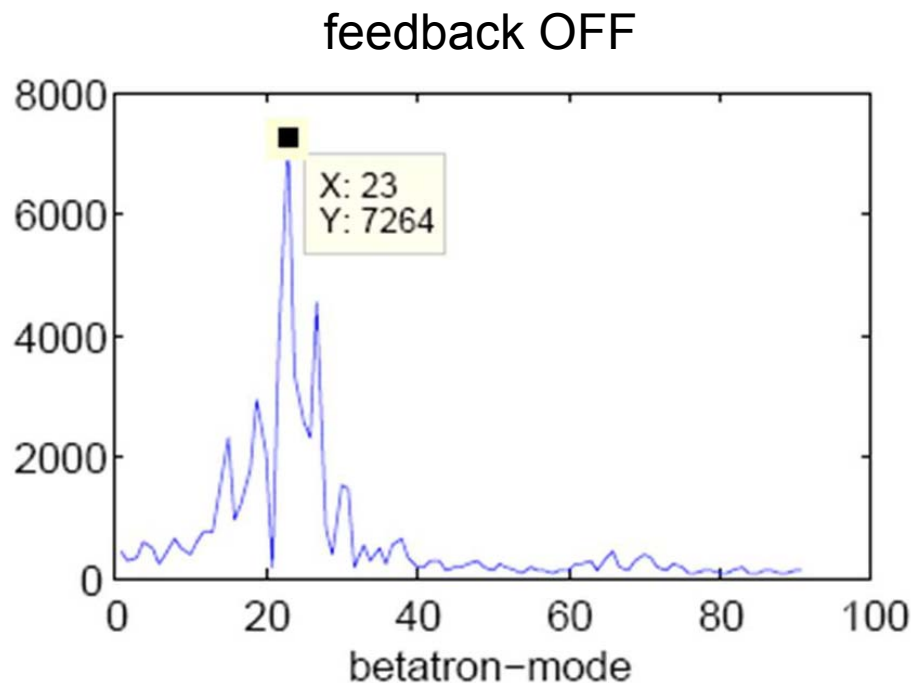
- Replacement of old BPM electronic by LIBERA-Brilliance
 - First batch (20 units) in 2011, next batch end of the year
- Advantage:
 - first turn option (injection optimization)
 - turn-by-turn option (instability studies)
 - 1 kHz acquisition (slow instability studies)
 - Stable control interface
- Diagnostics expert urgently needed
- Thanks go to Guenther Rehm, Diamond.



Bunch-by-Bunch Feedback System

- 1D system (vertical) installed at ANKA
 - now routinely used at 2.5 GeV to damp vertical instabilities
 - analyzing tool: identification of unstable modes

Take care the y-scales are different



Control System

- ACS (only @ ANKA) became less reliable after an upgrade

- Transition to more commonly used systems foreseen
 - PVSS for PLC based hardware
(used already at accelerator and beamlines)

- Decision: EPICS or TANGO?
 - TANGO used by beam lines
cooperation contract with ESRF/SOLEIL
 - EPICS preference for accelerators
 - easier to implement
 - more established in a larger community
 - not CORBA based

- Control system expert needed (position to be opened soon)

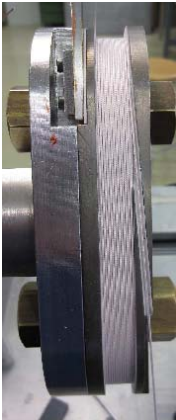
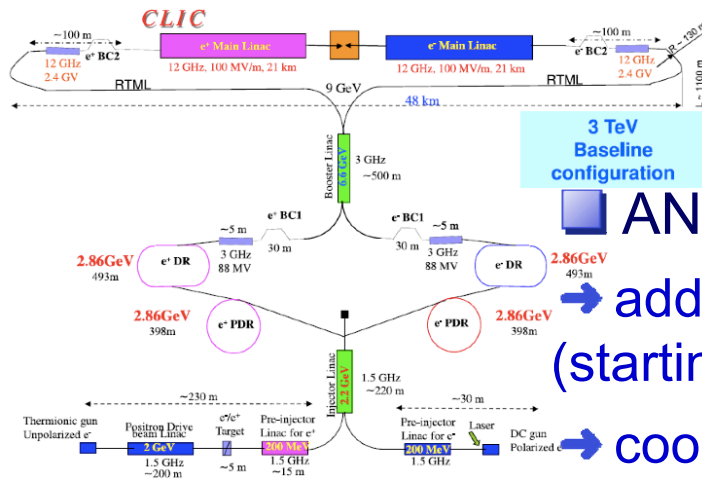
Superconducting IDs for ANKA

■ scIDs for the ANKA storage ring:

- SCU15 Demo, SCU2-15 and SCU20 for NANO beamline
- SCUW for IMAGE beamline

■ Understanding the scID needs of light sources around the world

→ COLDDIAG experiment is presently being installed at DIAMOND



- ANKA as test bed for CLIC damping rings
- additional benefit: wiggler for IMAGE beamline (starting 2012/13)
- cooperation with CERN & BINP (BMBF call)

Consolidation Plans for ANKA

- **Hardware measures**

- Fast orbit feedback & bunch by bunch feedback system

- to reduce low frequency oscillations

- improved current, stability, ...

- New RF amplifiers

- replace klystrons

- Replacement of the present control system (SCADA)

- enhanced reliability and modularity when adding further components

- Installation of new superconducting insertion devices

- **Strategic upgrades**

- Considerable increase of the machine personnel

- sustain a critical mass, implement upgrades & develop future projects

Summary

■ Accelerator components age

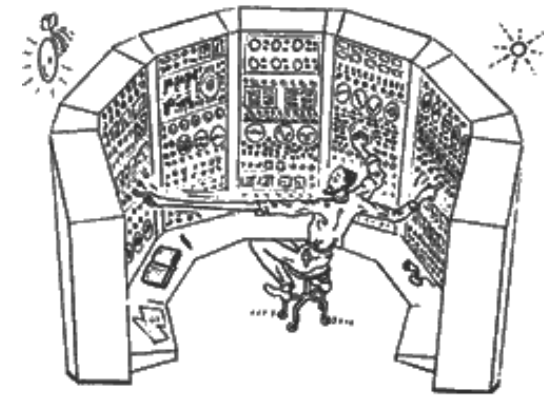
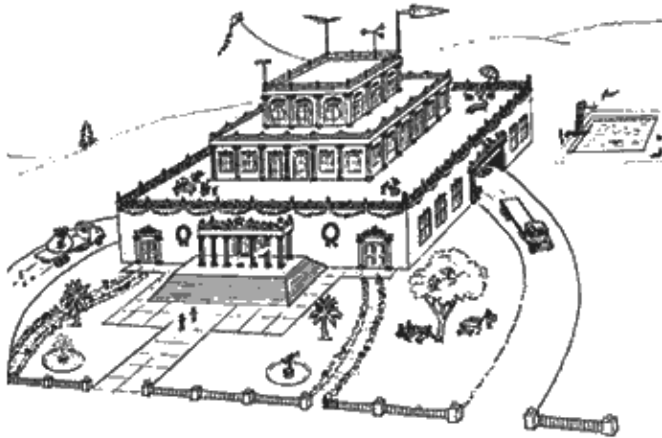
- problems & solutions: upgrade program started
- adequate operation funding & continuous investment funds required

■ Active and competitive R&D program in cooperation with other accelerator labs (e.g. ARD)

- 11 PhD students and 7 Postdocs (mostly 3rd party funded)
- upgrade to state-of-the-art

■ Ressources needed, in particular manpower

- recruiting started, needs to be further intensified



Thank you for your attention

IMAGE/X-MIC Twin-Beamlines

First beamline is monochromatic with resolution $\Delta E/E=10^{-4}$ for high resolution transmission microscopy

Second beamline is operational in three modes: white, pink & monochromatic beam, 240mmH and 36mmV

