# LLRF Tests

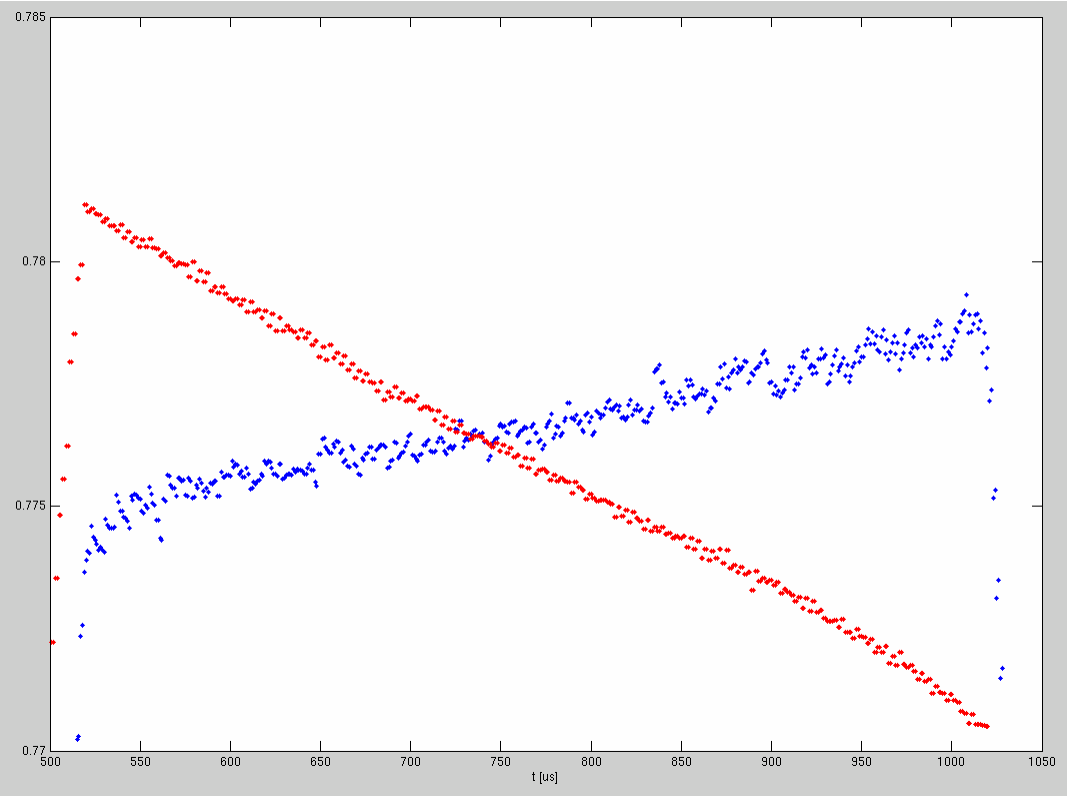
Tomasz Jezynski on behalf LLRF Team
DESY, Hamburg

# LLRF activity

- New IF scheme
- Piezo driver tests
- Klystron linearization
- Tools development
- SIMCON-DSP

# New IF scheme
# 9 MHz with averaging vs 250kHz

- Lower latency (detection 110 ns)
- averaging (9 samples)
- IF 9 MHz SF 54MHz
- noise reduction
- feed-back latency reduction




Flat-top of the vector sum
red – IF=9MHz
blue – IF=250kHz

# New piezo driver

- Comparing to the old one:
  - Simpler design (half a bridge only instead of the full bridge)
  - Flexible supply voltage (from external laboratory power supply)
  - High gain (G=100), possibility to direct connection to Simcon 3.1
- The purpose of the test were to check the amplifier in real operating condition (driving piezo)
- Integration with the control system

# Klystron non-linearity measurements and linearisation tool evaluation

- Open and close loop feedback loop operation with 6 cavities in vector sum.
- Klystron am/am and pm/am characterization for different High Voltage levels.
- Linearization tool performance test
- Integration with the control system

# Remote Diagnostic Unit

- Portable test and measurements unit for LLRF equipment consisting of:
  - Signal vector generator (3GHz) with arbitrary function (with IVI drivers)
  - Spectrum analyzer with IQ demodulation (3GHz) (with IVI drivers)
  - Portable scope (with IVI drivers)
  - Portable computer for data acquisition and processing, computer is equipped with wireless communication
- IVI allows for remote operation

# Remote Diagnostic Unit - Applications

- Measurements of down-converter parameters (dynamics, nonlinearity, noises, etc.).
- Measurements of up-converter and high power chain (amplifiers, klystron) parameters (dynamics, nonlinearity, noises, etc.).
- Test of the LLRF controller (with or without down- and up-converters) with predefined RF signal from signal generator and comparison of output signal measured by spectrum analyzer
- ...
- All can be done remotely with only little on-site support

# SIMCON-DSP

- Prototype has been tested, 30 boards in production
- 3 x SIMCON-DSP & SIMCON 4 will be installed in ACC1
- New down-converter (IF 54 MHz SF 81MHz)
- New software features
  - probe, forward and reflected signals
  - detuning and loaded Q calculation (during pulse)

# Availability of test facilities for LLRF

- Module Test Stand in not available for LLRF group (very limited time, almost impossible to schedule tests, no more tests in 2007)
- Chechia – available 1 or 2 days per month – hard to schedule tests

# Plans for next 6 months

- Installation of SIMCON-DSP system for ACC1
  - Redundant development system, several boards (3xSIMCON3.1,1xSIMCON4) for probe / forward / reflected power
- LLRF Conversion to ATCA by end of 2007

# Thank you