LLRF systems status update

FLASH 9mA collaboration

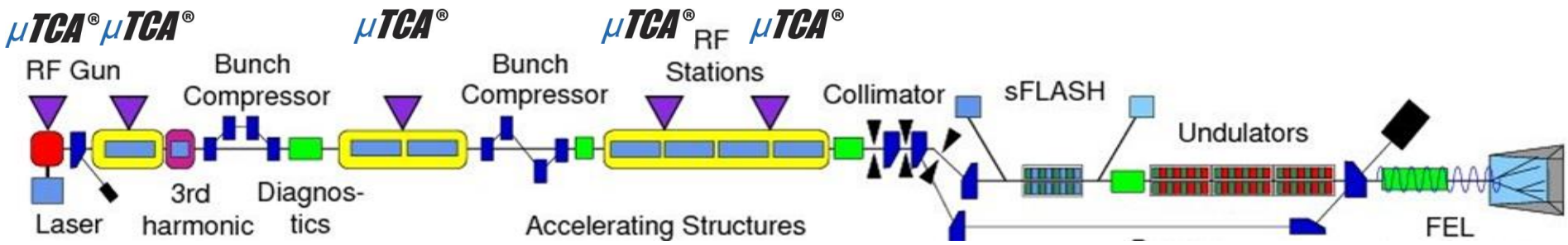
1. FLASH LLRF system upgrade
2. CMTB – CW operations

Julien Branlard
LLRF systems status update
DESY, February 19th 2014

HELMHOLTZ ASSOCIATION

DESY

FLASH with MTCA (1/4)

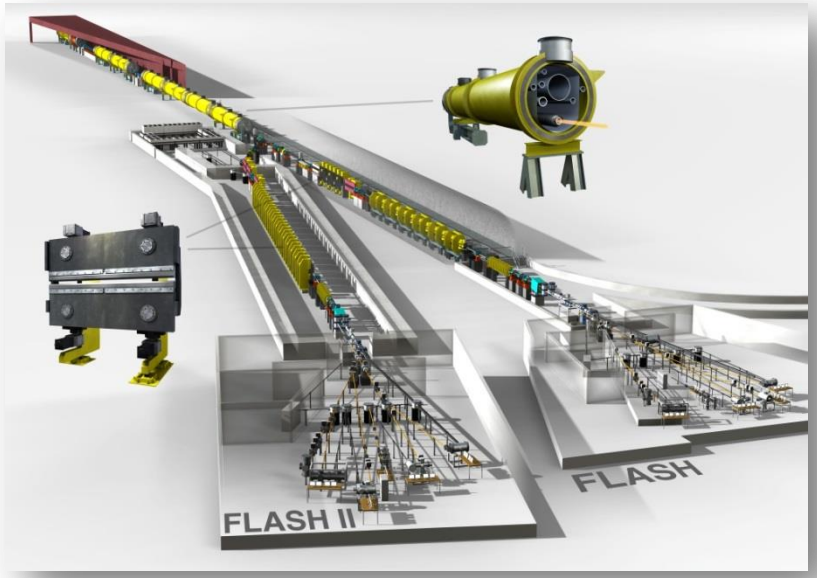


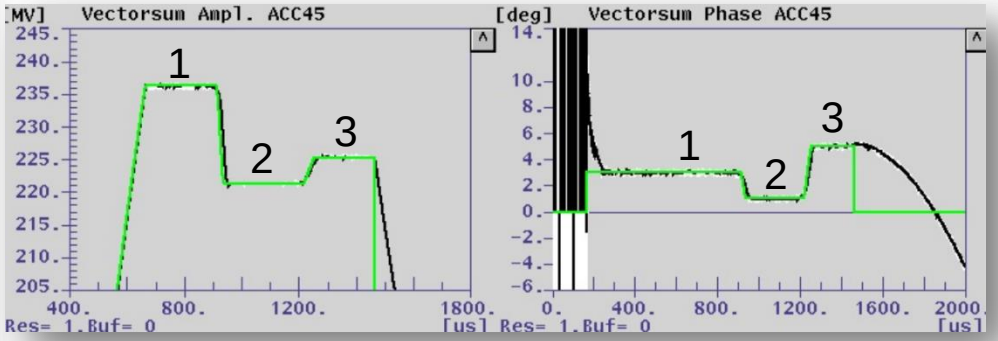
- All stations equipped with MTCA
  - GUN, ACC1/39, ACC23 inside tunnel
  - ACC45, ACC67 outside tunnel
- New gun (XFEL prototype)
  - not yet operated with MTCA
- Kept VME system
  - roll back + observer

FLASH with MTCA (2/4)

- Master timing system is now MTCA
- ACC5 now equipped with motorized Q_L
- Diagnostic upgrades
  - One new BAM (after ACC7)
- FLASH II operations (multi-beam line)
  - Test Spring 2014
  - Operation Fall 2014

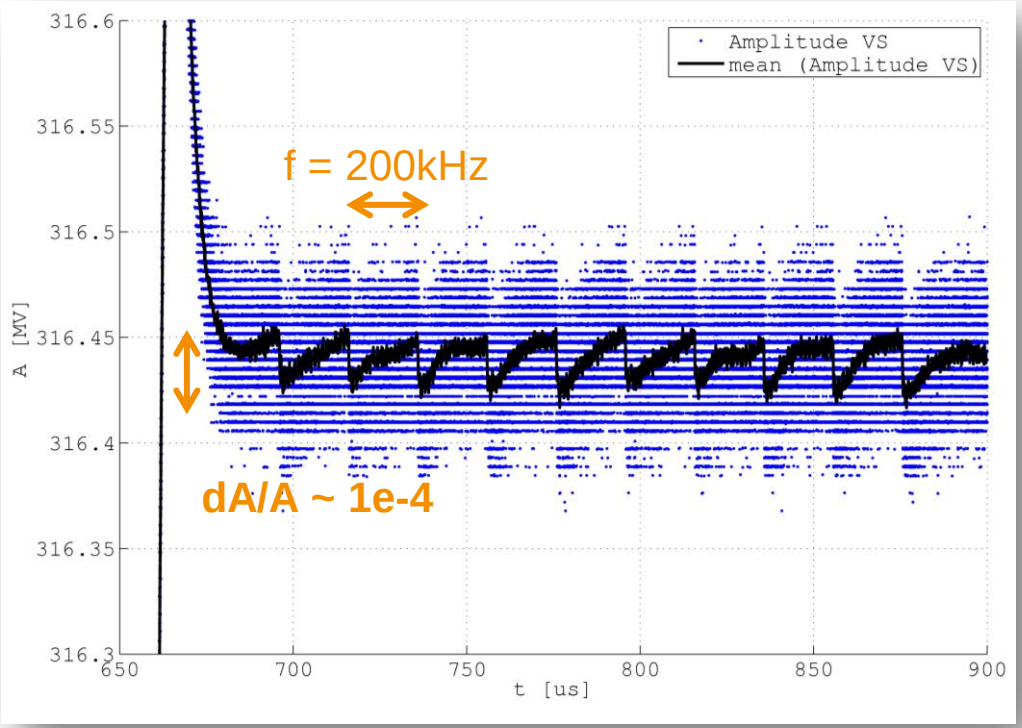
STATION	QL STATUS
ACC1	**Motorized QL**
ACC39	**New 3 stub tuners**
ACC2	Fixed QL
ACC3	**Motorized QL (new)**
ACC4	Fixed QL
ACC5	**Motorized QL (new)**
ACC6	**Motorized QL**
ACC7	**Motorized QL**





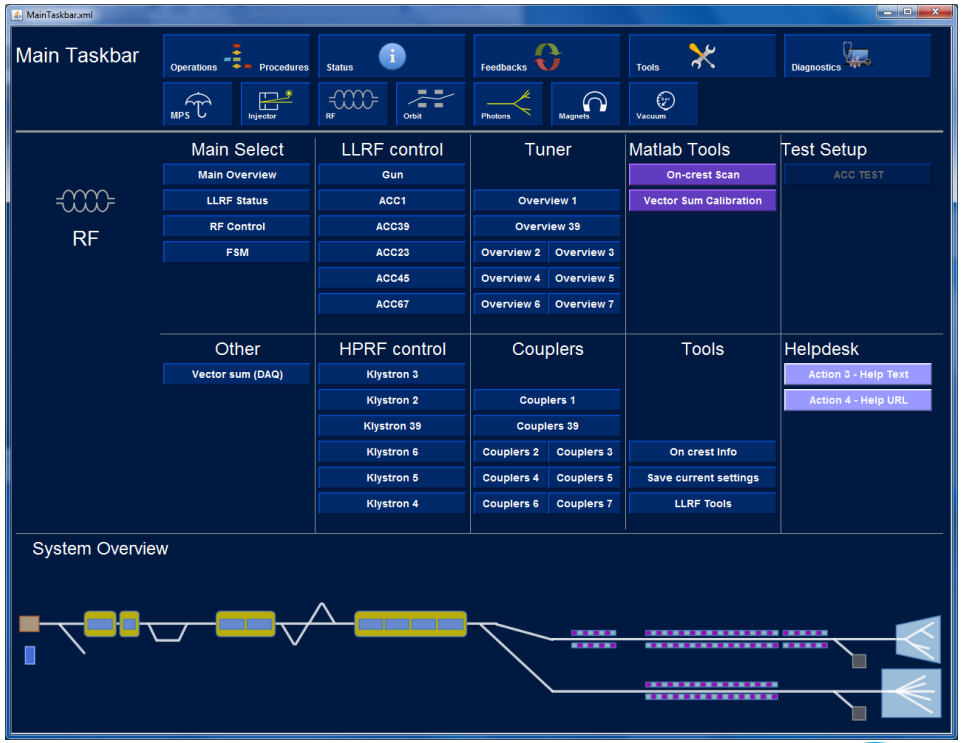
FLASH with MTCA (3/4)

- Higher system integration
  - Timing integrated in LLRF crate
  - Toroid and beam arrival monitor information in LLRF crate
  - Machine protection system not yet in LLRF crate (done at AMTF)
- Higher resolution
  - Single bunch transient visible
  - Better channel alignment
- Higher bandwidth
  - 8π/9 filtering



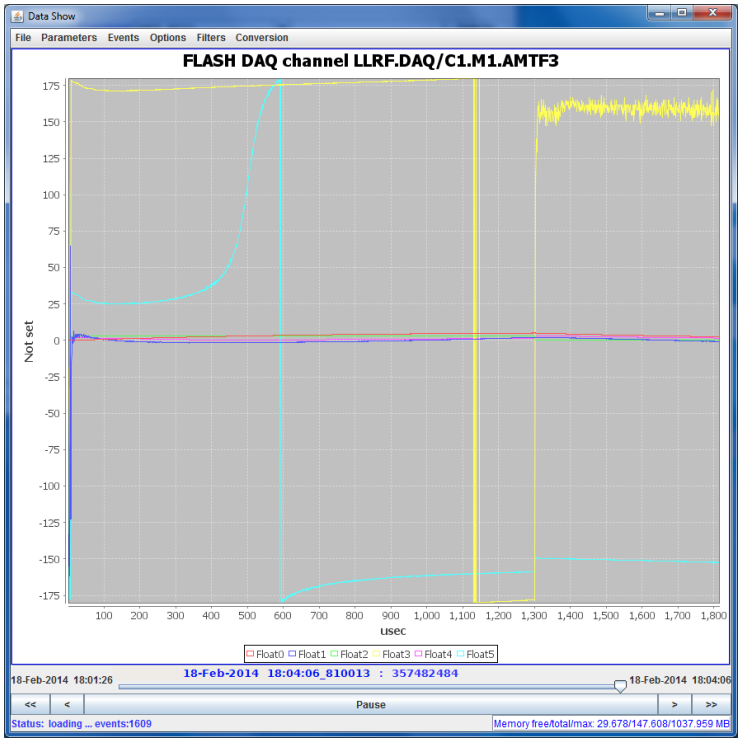
FLASH with MTCA (3/4)

- Higher system integration
  - Timing integrated in LLRF crate
  - Toroid and beam arrival monitor information in LLRF crate
  - Machine protection system not yet in LLRF crate (done at AMTF)
- Higher resolution
  - Single bunch transient visible
  - Better channel alignment
- Higher bandwidth
  - 8π/9 filtering
- Upgrade to jddd panels (java)
  - nicer & slower



FLASH with MTCA (3/4)

- Higher system integration
  - Timing integrated in LLRF crate
  - Toroid and beam arrival monitor information in LLRF crate
  - Machine protection system not yet in LLRF crate (done at AMTF)
- Higher resolution
  - Single bunch transient visible
  - Better channel alignment
- Higher bandwidth
  - 8π/9 filtering
- Upgrade to jddd panels (java)
  - nicer & slower
- DAQ problems with IT
  - Bandwidth bottleneck
  - Work around currently under test



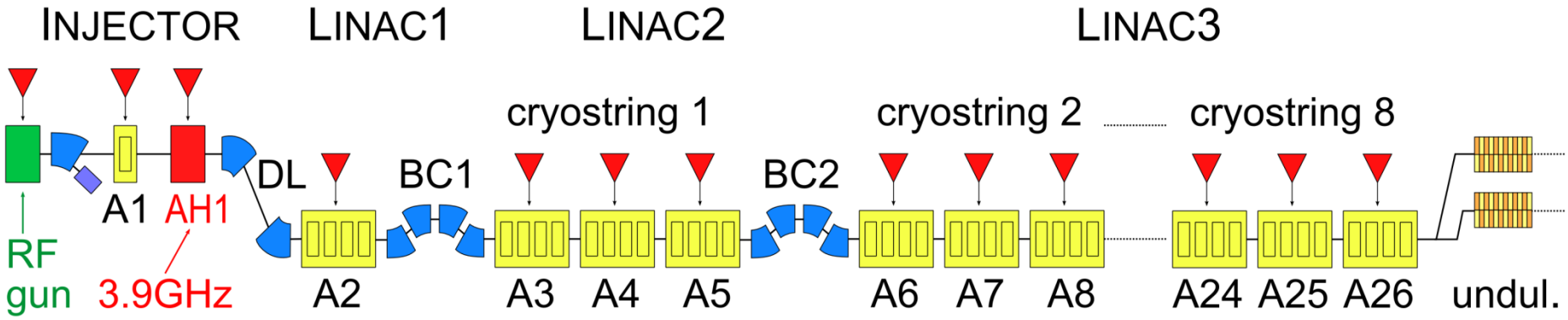
FLASH with MTCA (4/4) : software upgrade

- Adapted to MTCA (not rewritten)
- Diagnostic server (Q_L calculation, detuning)
- Q_L control (not fully commissioned)
- Quench detection (not yet commissioned at FLASH)
- Routine operation servers
  - Beam loading compensation (BLC) with toroid corrections
  - Learning FF (LFF)
  - Output rotation correction (ORC)
  - Piezo automation (not yet commissioned)
  - Pre-limiters (not yet commissioned), limiters are
- FLASH operation
  - User run March 2014
  - More down time attributed to LLRF but overall stable

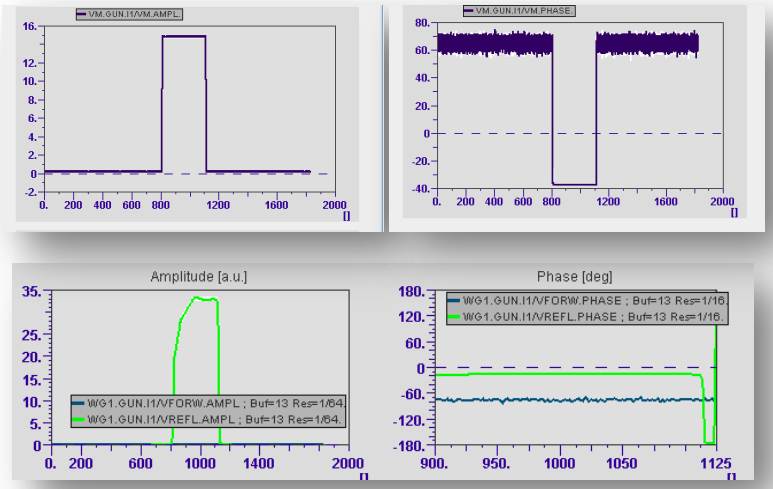
CMTB

- MTCA LLRF + new piezo driver
- XM-3 cryomodule XFEL pre-series (7x large grain, 1x fine grain)
- CW and LP operation mode with 80 kW IOT (Q_L = 1.5e7)
- Pulsed mode with 5 MW klystron (Q_L = 3e6)
- Used for Q_0 wrt. cooling cycles
- Used for test bench for new hardware (TCK7-VM2.0)
- New IOT from CPI to be tested and characterized
- Schedule unclear
  - How long will the module stay there ?
  - XFEL has priority (man power is an issue)
- CW operations with MTCA (single cavity regulation) at HZDR

XFEL (if time)



- LLRF RF gun installed and commissioned



Nov. 2013 : commissioning