Status of the recent
Tools development at FLASH

this work was done by
R. Kammering with (many) contributions from
C. Schmidt and J. Carwardine and others

Overview

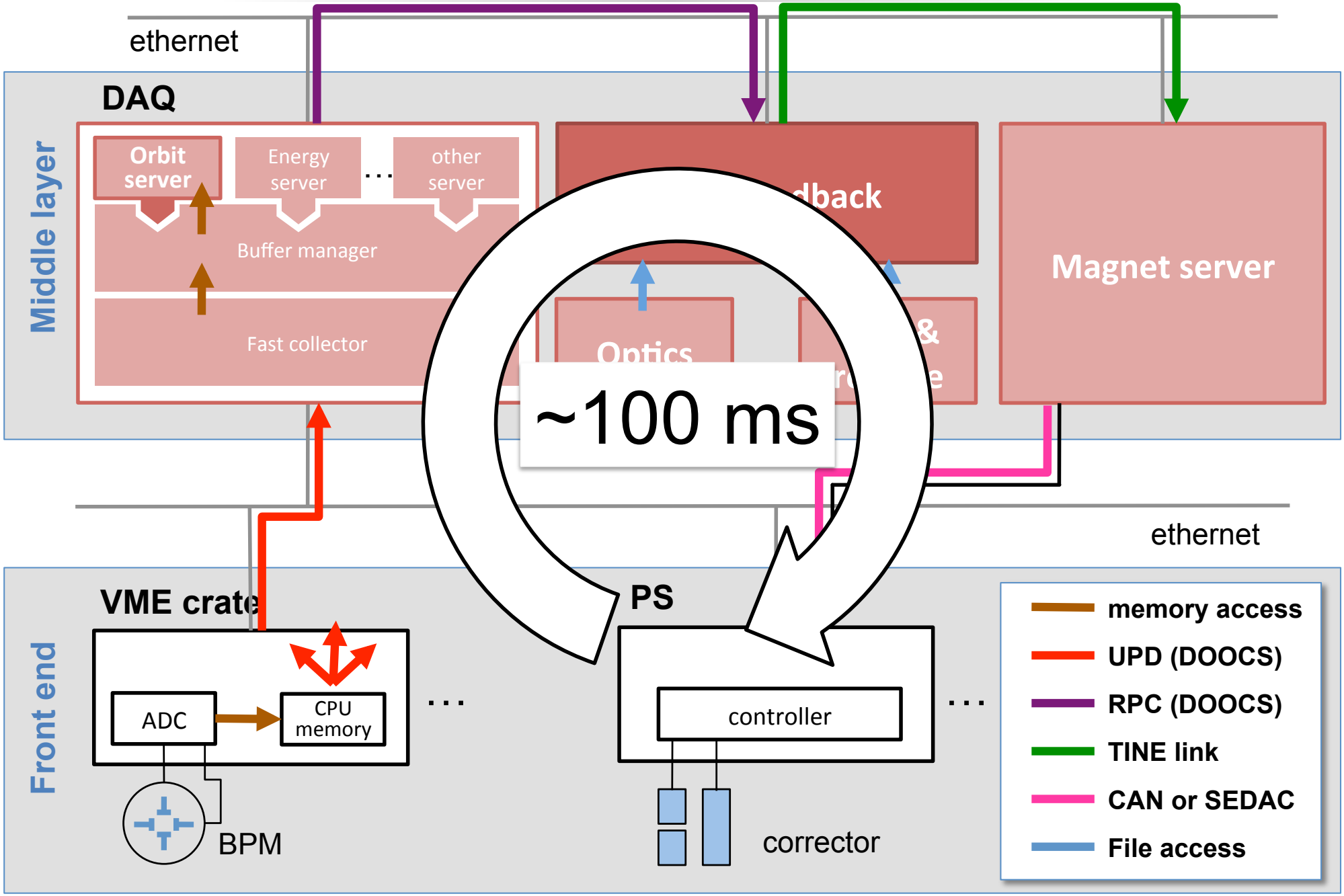
Will give an overview of the status for the

- *Orbit FB*
- *global slow longitudinal FB* (or *slow RF FB*)
- *chicane server*

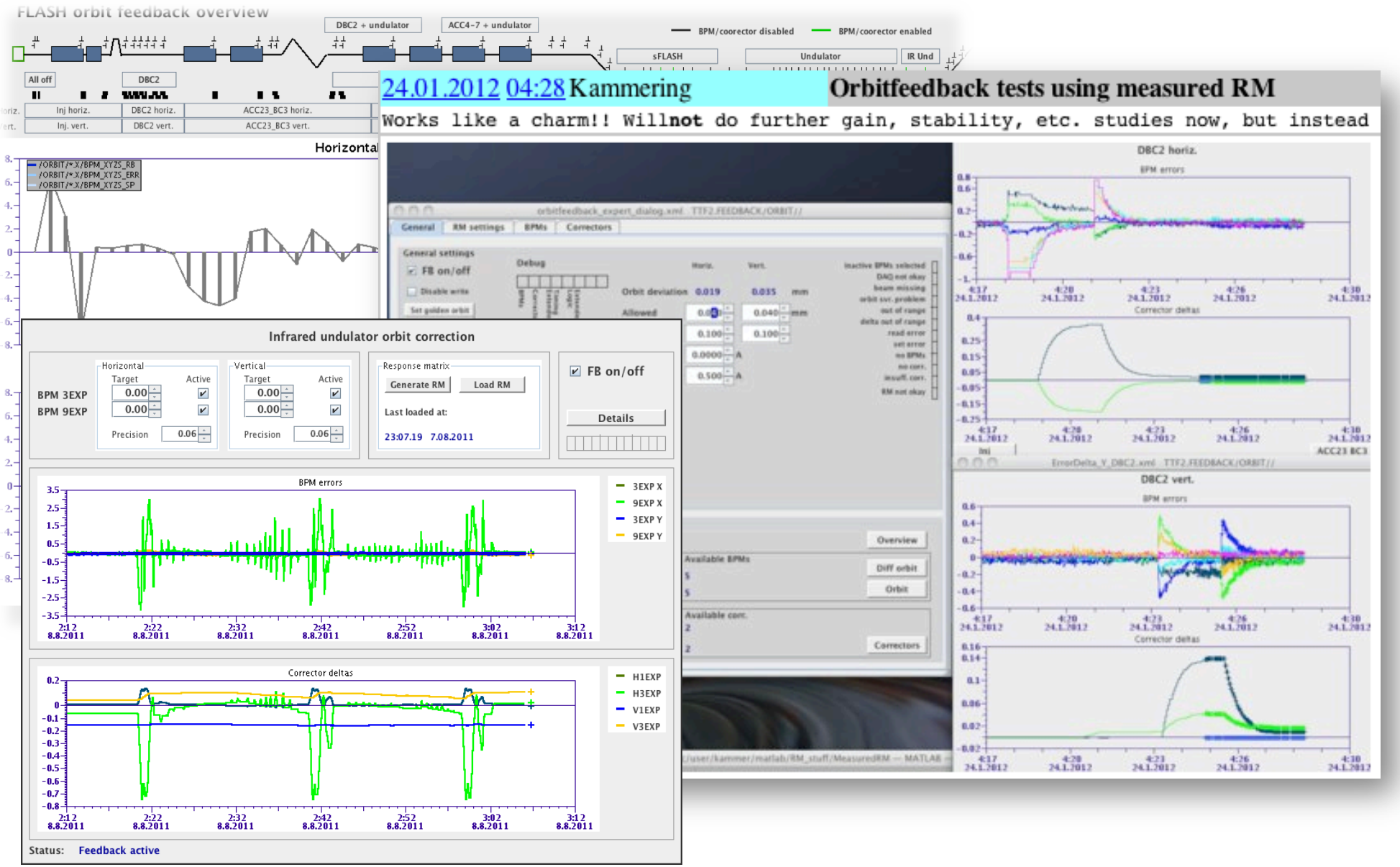
Orbit FB – some facts

- started already in 2010 ☹
- global FB able to use **any BPM/steerer**
- uses **external provided** inverse **response matrix**
- simple **PI-controller**
- implemented as **DOOCS middle layer server** (C++)

Orbit FB – architecture

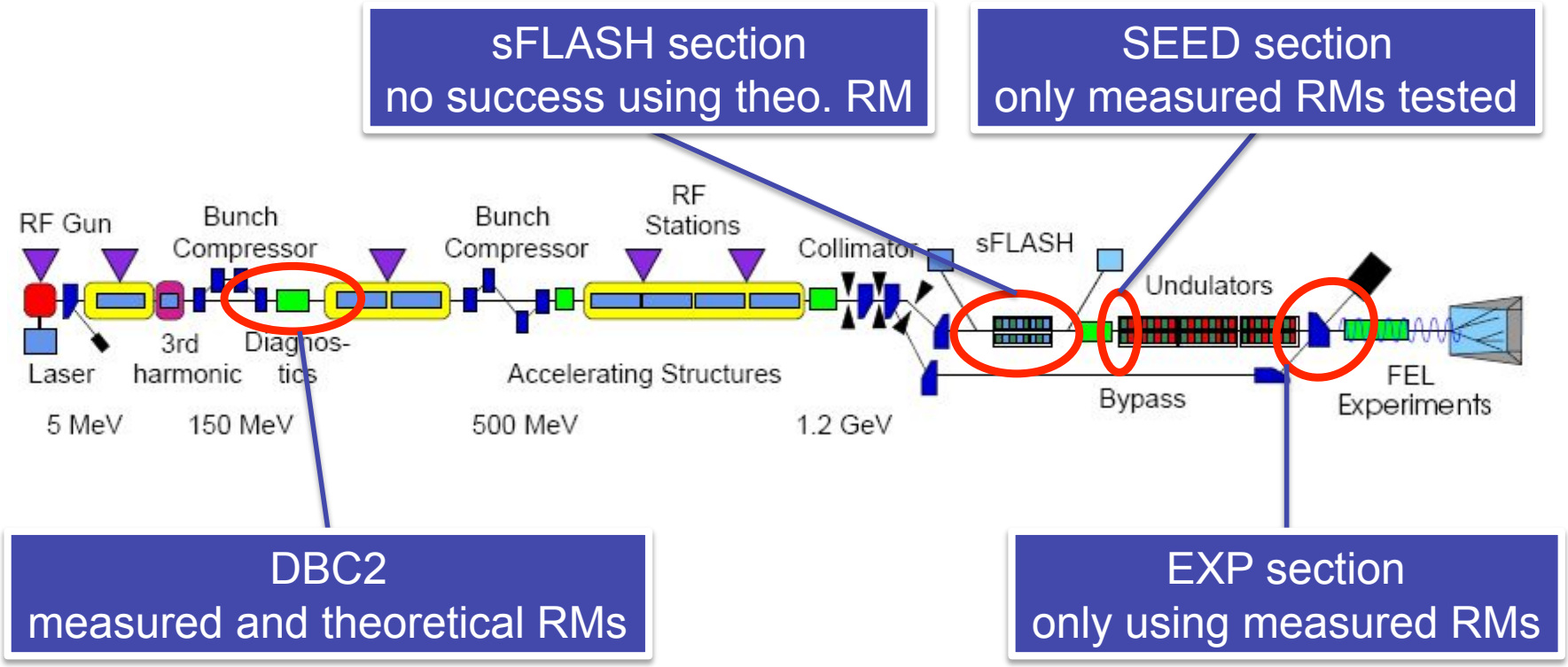


Orbit FB – status



Orbit FB – status

the orbit FB has been running:



Orbit FB – status

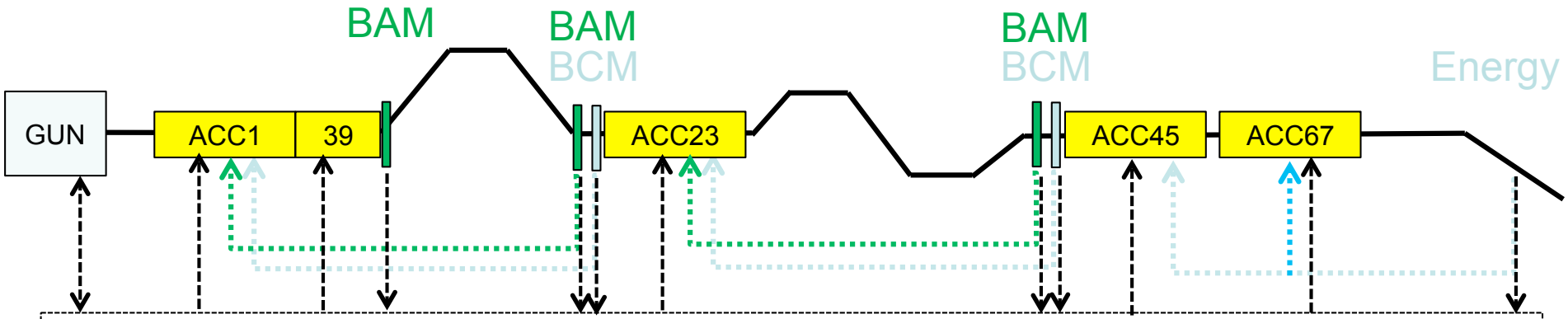
- Works **fine** for **measured RMs** (always)
- worked **partly** fine with **calculated RMs** (some bugs have been fixed → much better)
- Needs much more **operator friendly** invocation
  - how/where to get RMs
  - user interface: predefined sections, simpler panels

[for details see e.g.: http://accelconf.web.cern.ch/AccelConf/pcapac2010/papers/wepl015.pdf]

slow RF FB – motivation

- **Replace 5**! independent **Matlab GUI** based FBs …
  … controlling the **compression**, **beam arrival time** and **energy**
- One **global FB** (FBs *"know of each other"*)
  → better performance
- uses **external measured RM**
  (internally inverting using SVD)
- DOOCS based **middle layer server**
  (directly attached to the DAQ)

slow RF FB – architecture

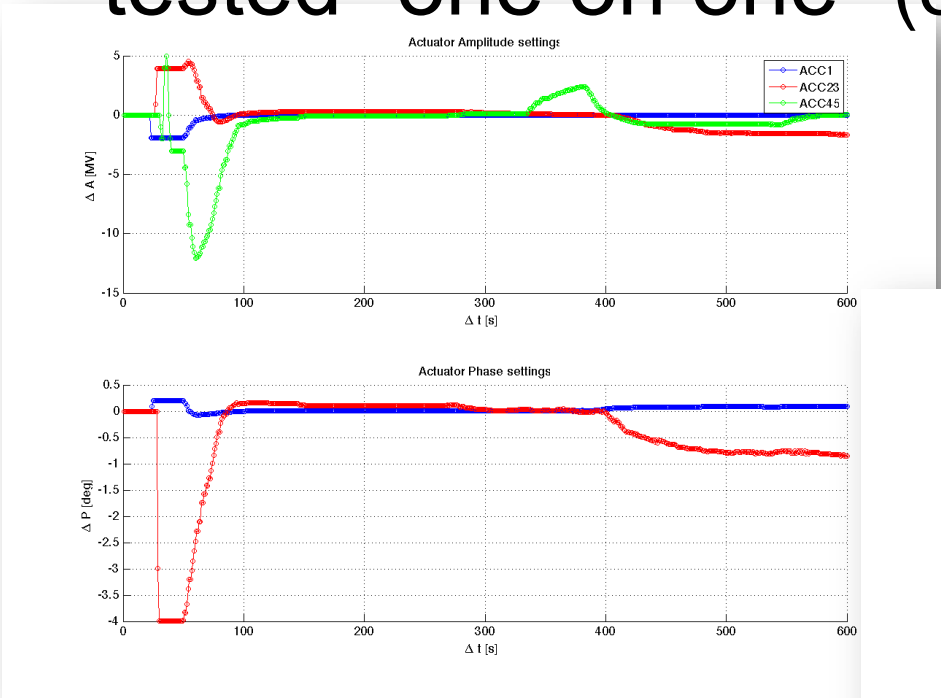


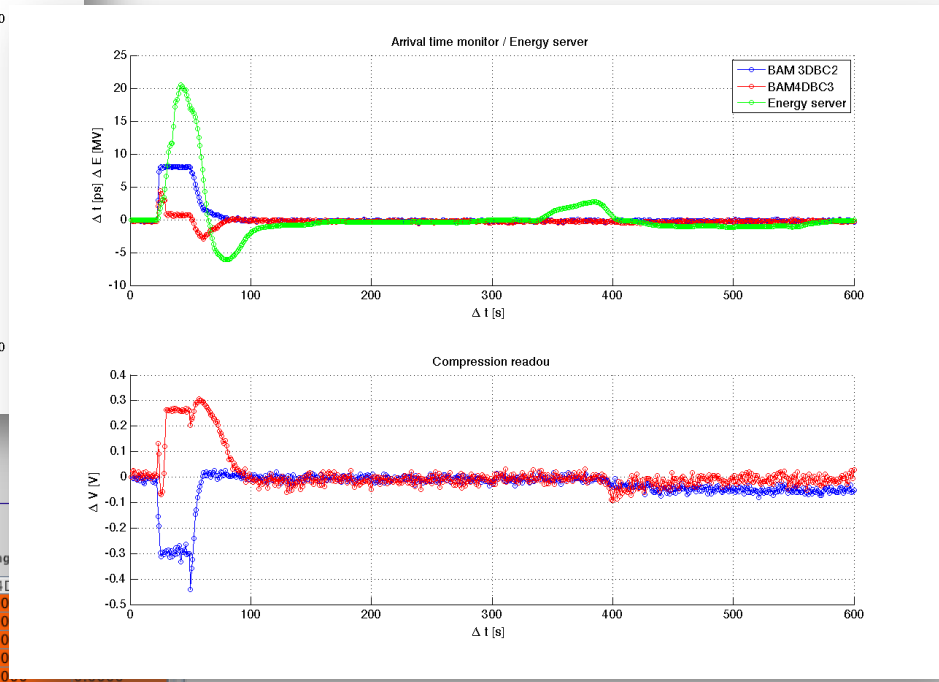
$$\begin{pmatrix} SP.A_{ACC1} \\ SP.P_{ACC1} \\ SP.A_{ACC39} \\ SP.P_{ACC39} \\ SP.A_{ACC23} \\ SP.P_{ACC23} \\ SP.A_{ACC45} \\ SP.P_{ACC45} \\ SP.A_{ACC67} \\ SP.P_{ACC67} \end{pmatrix} = \begin{pmatrix} K_{11} & K_{21} & \cdots & & \cdots & K_{61} \\ & \ddots & & & & \\ & & \ddots & & & \\ & & & \ddots & & \\ & & & & \ddots & \\ & & 0 & & & \vdots \\ & & & & & K_{69} \\ & & & & & K_{610} \end{pmatrix} \begin{pmatrix} BAM_{1UBC2} \\ BAM_{BC2} \\ BCM_{BC2} \\ BAM_{BC3} \\ BCM_{BC3} \\ E_{Dogleg} \end{pmatrix}$$

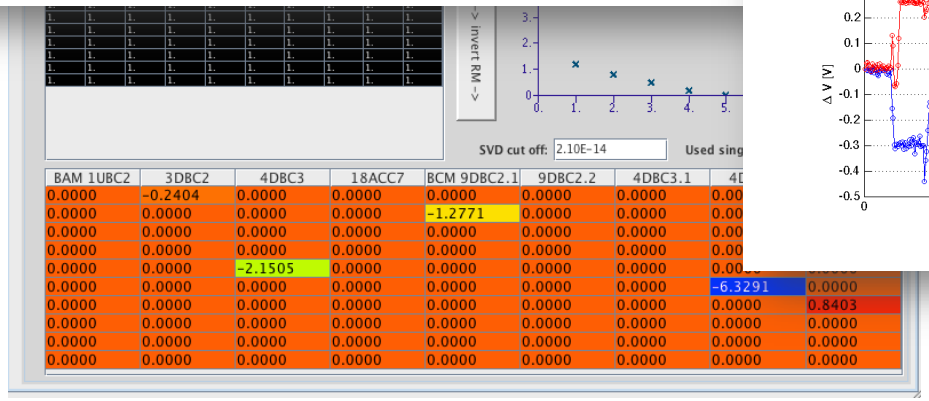
inverse measured response matrix

slow RF FB – first results

tested “one on one” (equivalent to old FBs)

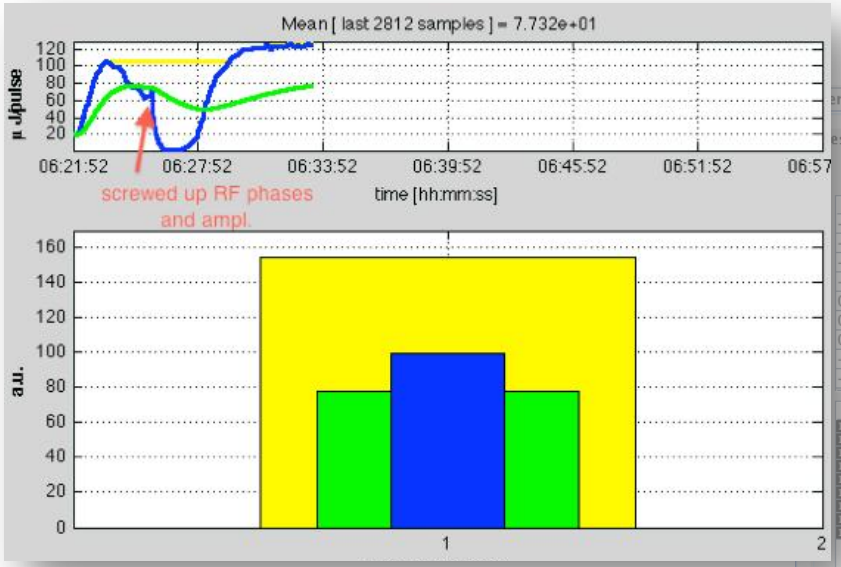


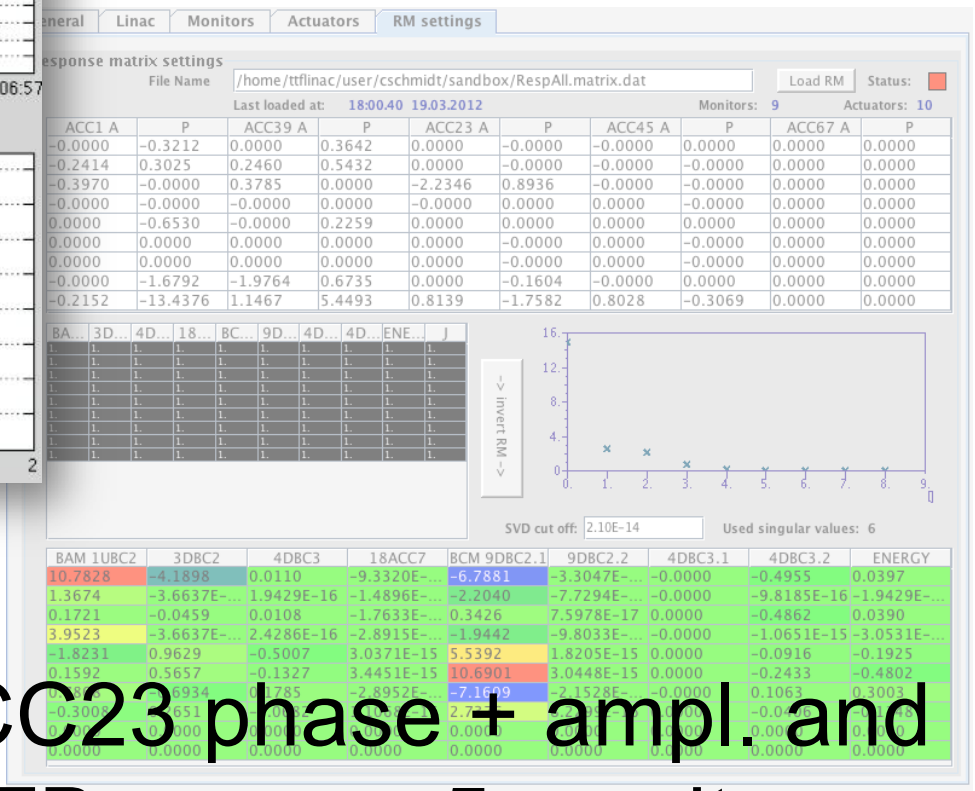




slow RF FB – first results

test using “full RM”





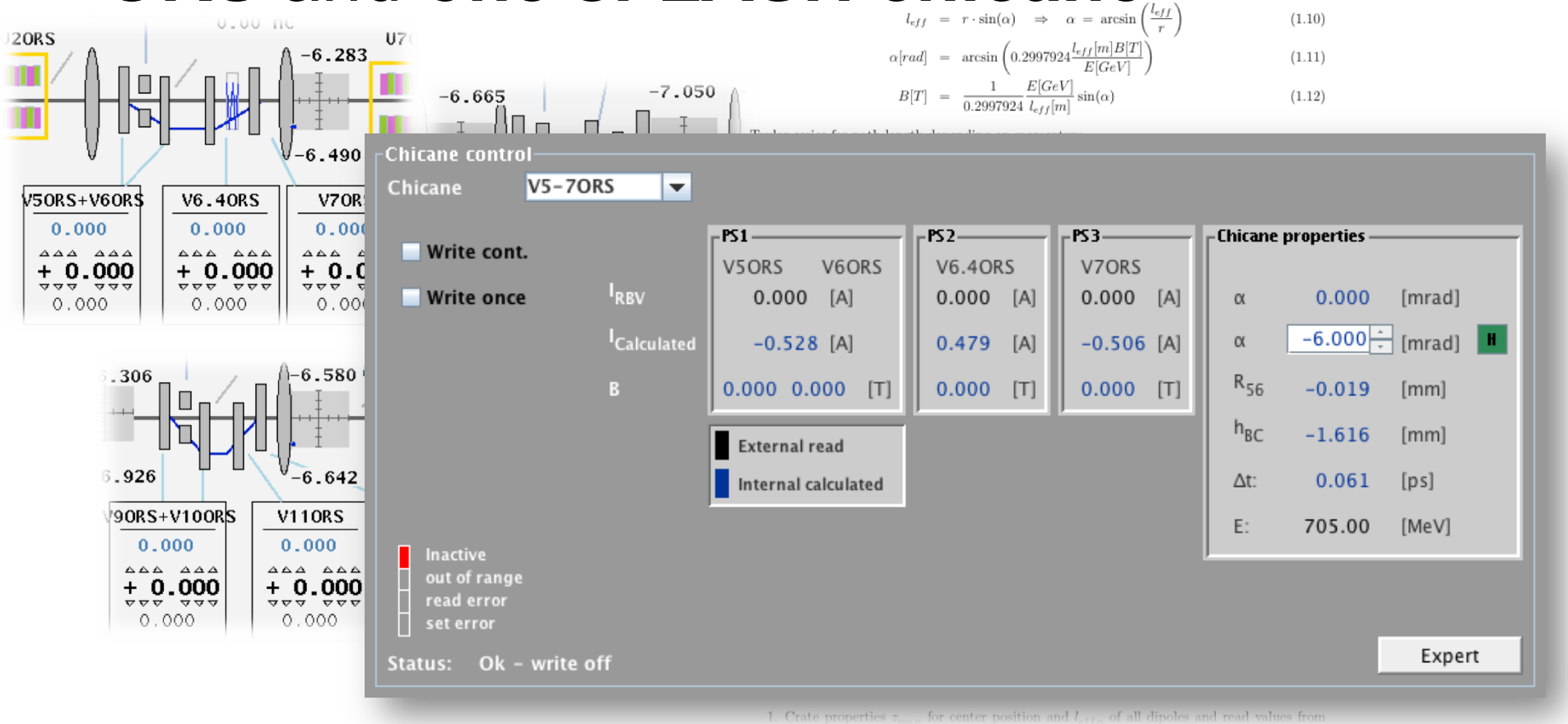
screwed up ACC1, ACC23 phase + ampl. and ACC45 ampl. → let FB recover 5 monitor targets

slow RF FB – status

- robust and "*full*" **RMs work pretty well**
- **behavior** of **RMs** at different e.g. energy, compression scenarios **untested** so far
- **Needs** still (much) work on **exception handling**
- Needs more **simple GUIs** → on it's way

chicane server – purpose

small DOOCS based server to drive the **two ORS** and **one sFLASH chicane**



Summary

- good step towards much **more robust server based** control of FLASH's complex hardware
- nevertheless **much overhead** compared to Matlab script "*hacked within the shift*"
- **DOOCS** and **jDDD** provide **powerful** combination for development of **"high level" middle layer software**
- **all** these **developments designed** to be fitting the to **XFEL** needs

Thanks for your attention!