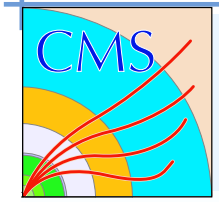

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PSI

BPIX Integration: Lessons learned

2013 Pixel Replacement/Upgrade Discussion Meeting

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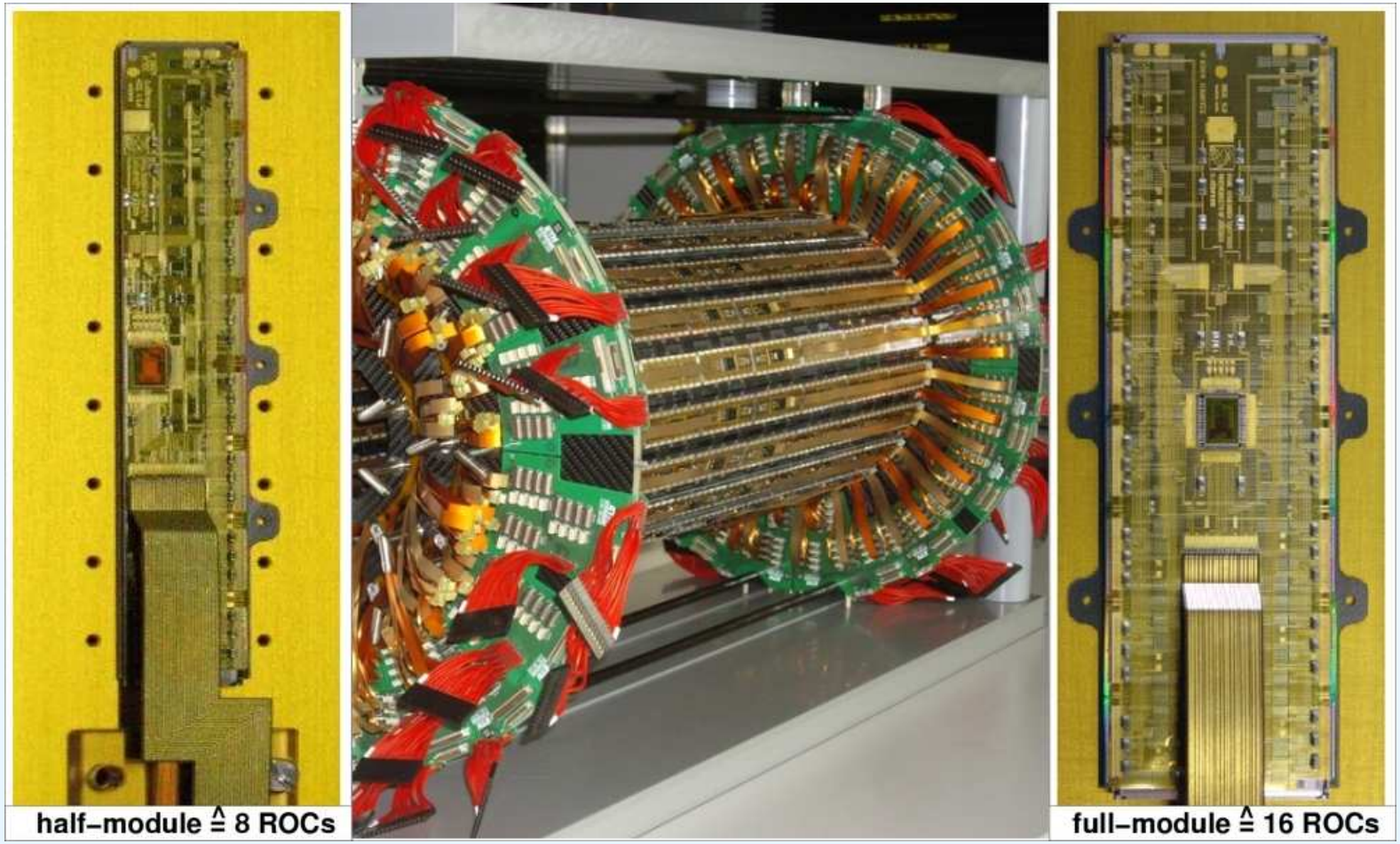
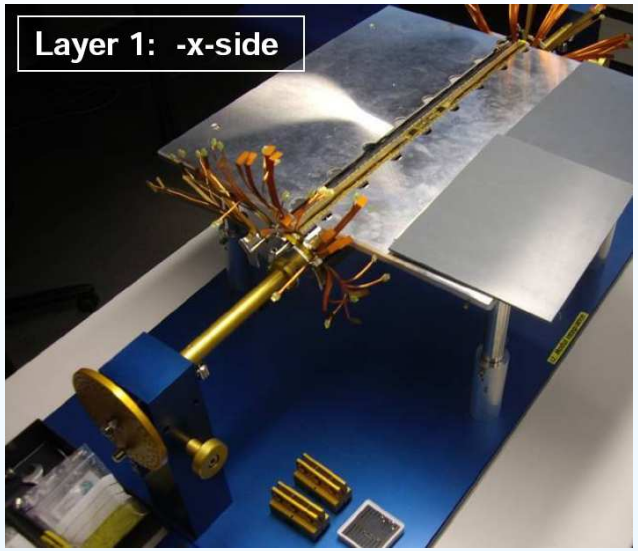
The Task

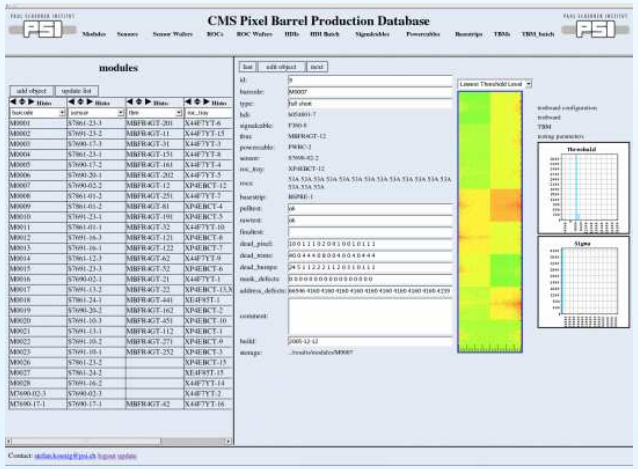


- integrate 700/100 full/half modules on 2x3 barrel shells
- verify function & connectivity through endring prints
- test HV connections

The Tools

- module mounting tools
- integration DB + web-interface:
  - draw the right module
  - cut/set right properties
  - record keeping
- testboard + Laptop for testing
- HV-connection test:
  - multimeter, torchlamp + HV-supply





Integration of a Module

- draw one mounting group (4 modules) from storage *
- verify module usability (Hub id's possible & cables long enough) *
- set Hub-ID *
- put module in protective cover
- cut cables *
- prepare powercable & solder & pott new power plug
- bend & scotch cables *
- mount modules on strukture *
- connect cables to endprint

* with help of DB webinterface

...testing

- layer 1+2:
  1. test modules after mounting
  2. test through endprint after shells are combined
- layer 3:
  - test modules as group through endprint
- final testing done with supply tubes attached

...Problems???

found in first test stage(s):

- wrong Hub-ID $\Rightarrow$ easy replacement/repair
- cables to short $\Rightarrow$ replacement/reusing on other position possible
- (unstable) connection $\Rightarrow$ replugging/resoldering power plug

found in system test mostly/only:

- bad HV connection undetected before/ created during final handling
- strange/no readout in test with final configuration

each of the latter caused disassembly of whole 3 layer system:

- MUCH WORK - repair not 100% efficient!

after 3 iterations decided to stay with given result

lessons learned

- try to avoid human factor in cable cutting/resoldering next time
- reduce need/number of un/plugging modules next time - individually handle-& testable layers!
- testprocedures during/before integration and in final system should exactly match to avoid system effects (1% of modules!)
- manual mounting of modules worked like a charm! - KEEP THIS!!!
- only ONE type of modules next time!
- record keeping work intensive & only possible with local production DB - KEEP!
- at least TWO integration tools/stations next time !
  (reduced working peoples 'deadtime' esp. @ the end)

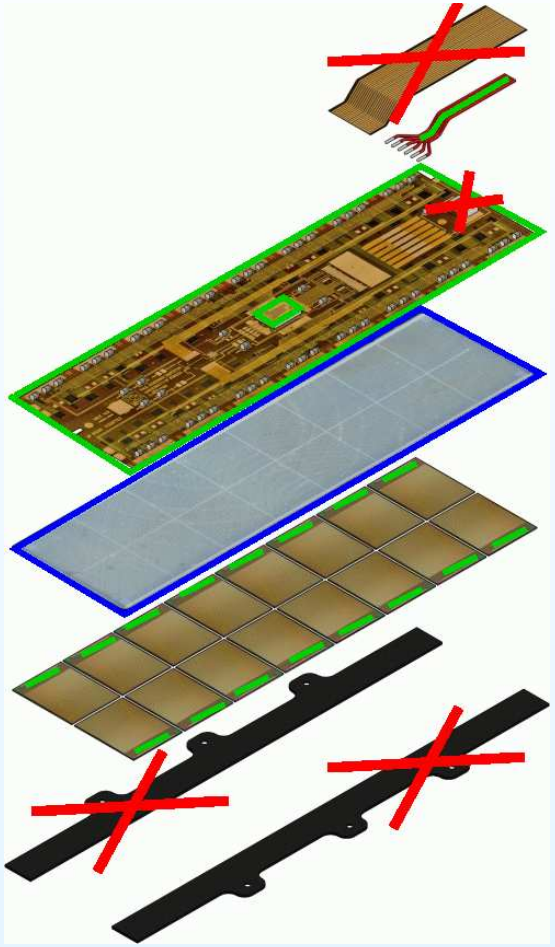
next talk...

trimm fat @ modules for 'Phase-1':

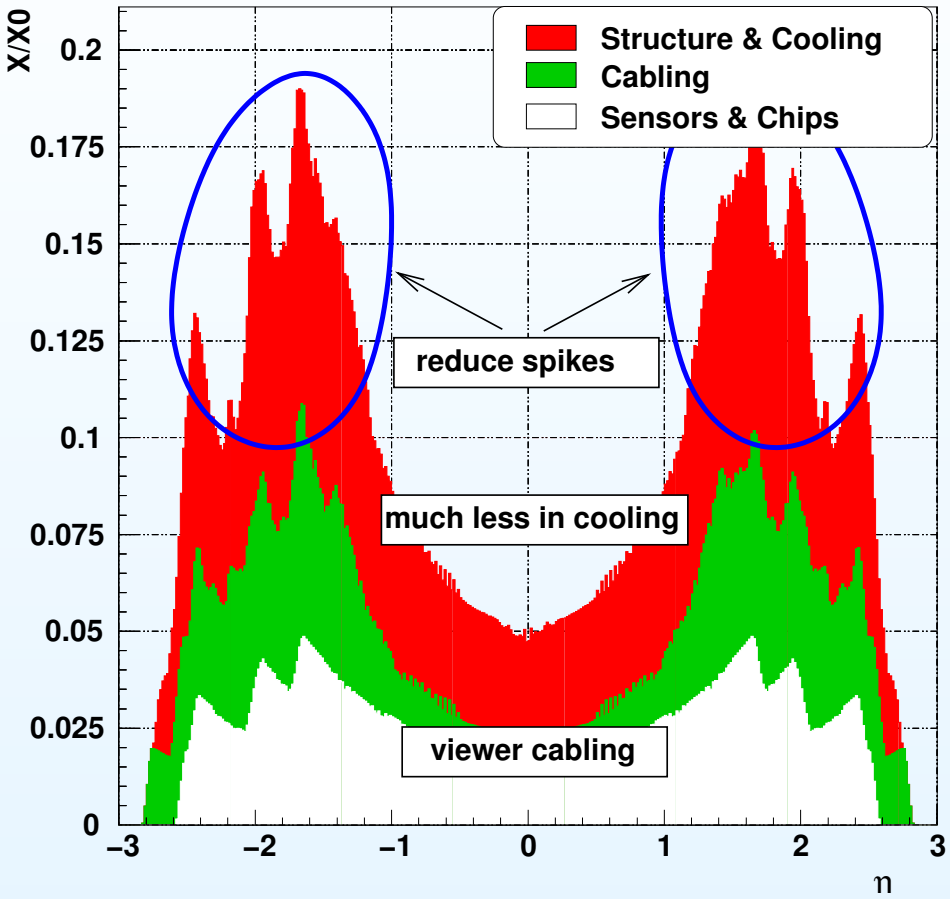
- fewer/thinner but longer cables
  $\rightarrow$less connectors
  $\rightarrow$move connectors/portcards out of active
  $\rightarrow$compatible with fast digital transmission
- no/smaller HV-capacitor
- thinner ROCS (175μm $\Rightarrow$75μm)
- no basestrips (modules glued on structure)

module production almost 'as is' - verify/develop:

- bumpbonding of thinner chips
- connection of long cables to HDI



trimm fat @ modules for 'Phase-1'- Outcome



reduction potential (incl. CO_2):

- structure, cooling & cabling ~ 50%
- module: ~30%
- extra reduction in spikes:
  - connectors/portcards moved out of active
  - no cooling manyfolds
- overall ~33%

phase I SCMS pixel tracker could have three layers for the material of two...