Endcap Module Status

SCT Steering Group 30. 4. 2002

- module assembly
- measurement program
- next steps
- beyond FDR

K5 Modules for FDR Measurements

module	type	assembly site	purpose	status
K302	outer	Freiburg/Manchester	system test	available
K400	outer	Freiburg/Valencia	system test	available
K303	outer	Valencia	system test	available
K402	outer	Manchester	system test	available
K305	outer	Geneva	PS irradiation	under constr.
K308	outer		PS irradiation	under constr.
K309	outer		system test	not yet built
K310	outer		system test	not yet built
K312	outer		system test	not yet built
K300	middle	Freiburg/Manchester	system test	available
K301	middle	Freiburg/Manchester	system test	available
K306	middle	Munich	system test	not yet built
K304	inner	NIKHEF	thermal meas.	under constr.
K307	inner		PS irradiation	under constr.
Kxxx	inner		system test	not yet built
Kxxx	inner		system test	not yet built
Kxxx	inner		system test	not yet built
K3xx	hybrid		BER test at RAL	available

Thermo-mechanical Tests

- show that detector temperature and runaway specs are met on
  - ‚thermal' inner module
  - PS-irradiated inner module
  - PS-irradiated outer module

  ✍ modules under construction

- show that module survives thermal cycling
  ✍ under way at Manchester (K300, K301)

- measure distortions of module cooled from RT to –20°C
  ✍ under way at Manchester (K300, K301)

- show that thermo-mechanical properties are not changed by irradiation

- radiation length

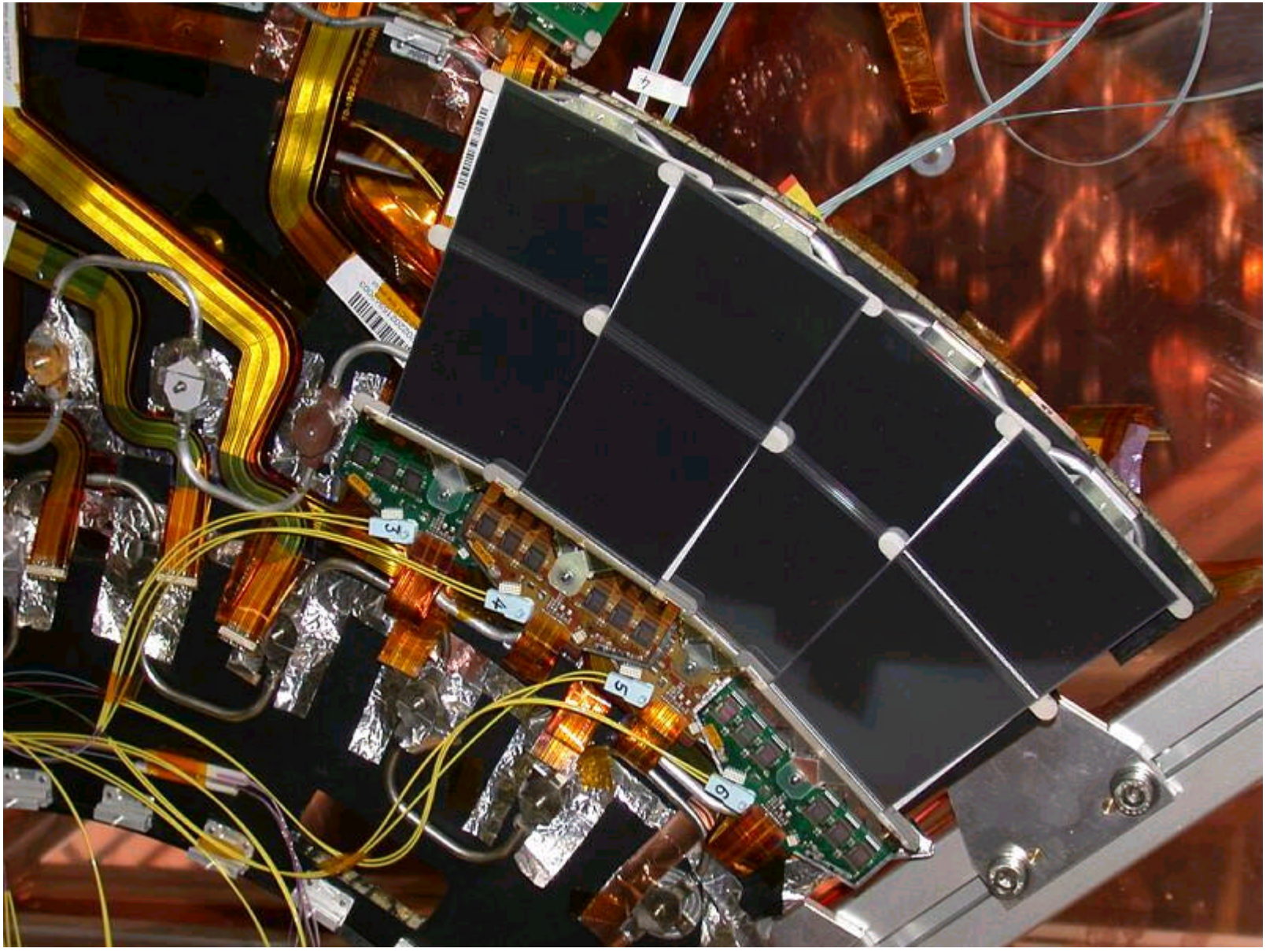
- mechanical strength and handle-ability

- updated module drawings
  ✍ available soon

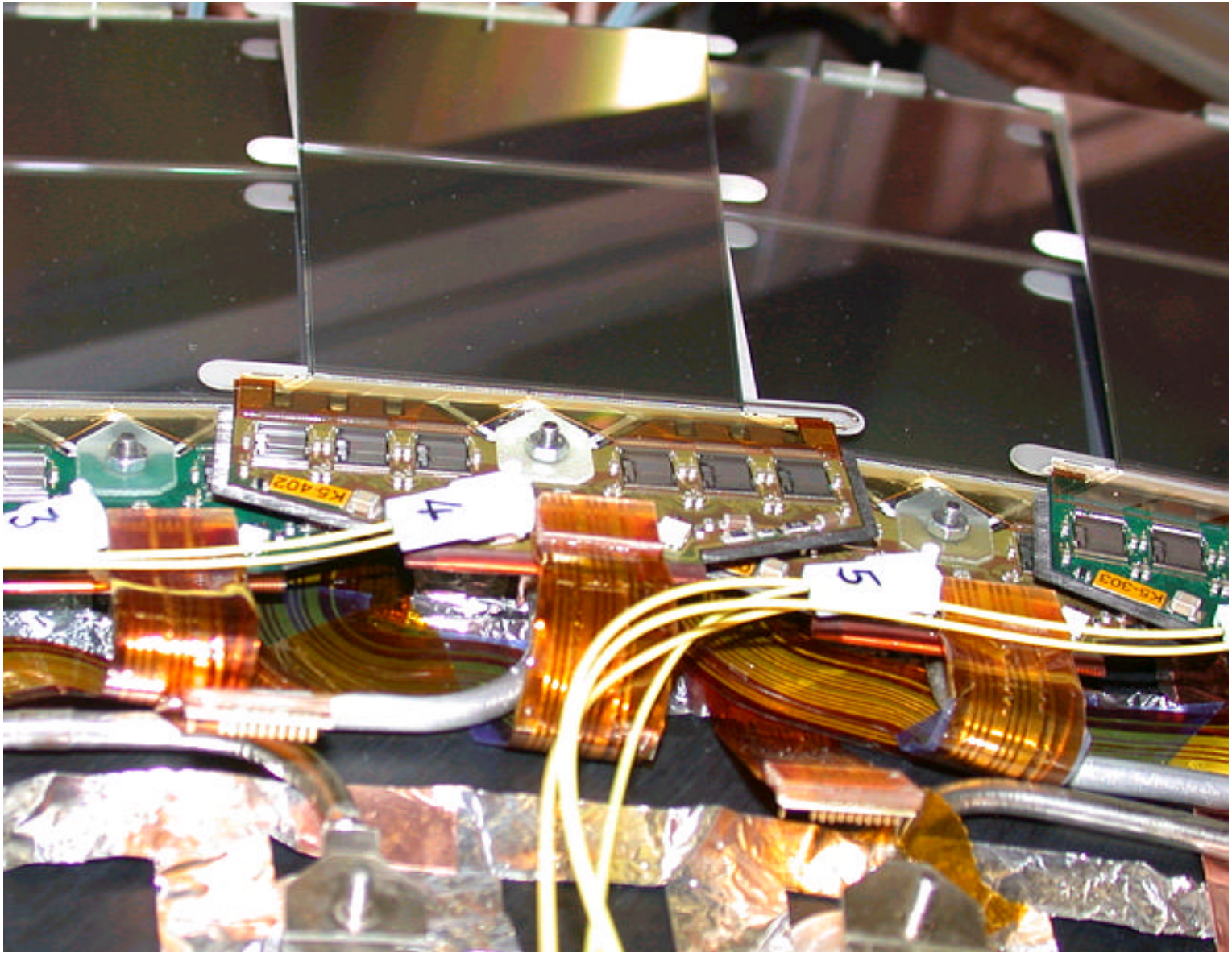
Electrical Measurements

- single module tests
  - done for each module at assembly site and on the system test sector (at least)
  - source measurements at Prague and CERN progressing,
    Prague: median charge of 3 fC (Sr-90 source, scintillator behind module)
  - bit error rate test on hybrid: no errors observed
    ✍ BER<1.9 10^{-11} and 1.6 10^{-10} at 90% C.L. (spec 10^{-9}), no evidence for cross talk
- system test measurements
  - see next slides
- irradiation May 6 - 15
  - two outer modules powered and read out
  - one inner module unpowered for thermal tests
  - SEU tests for opto components comparing opto and electrical readout for the outer modules
- beam test May 27 – June 5 (12)
  - focus on endcap modules
  - irradiated: 2 outer modules
  - unirradiated: 2 outer, 1 middle, 1 inner module
  - plus 2 KB modules
  - plus 2 barrel modules

4 outer modules on system test sector

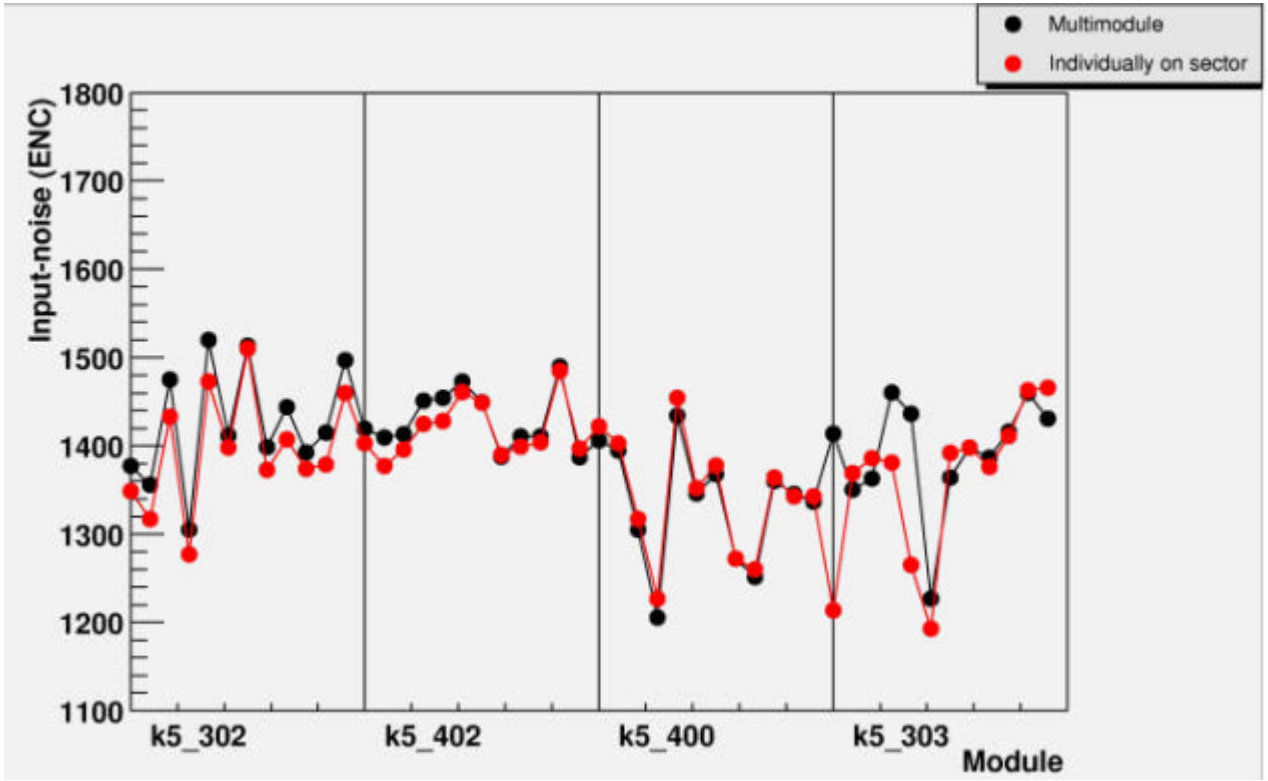


close view from hybrid side



System Test

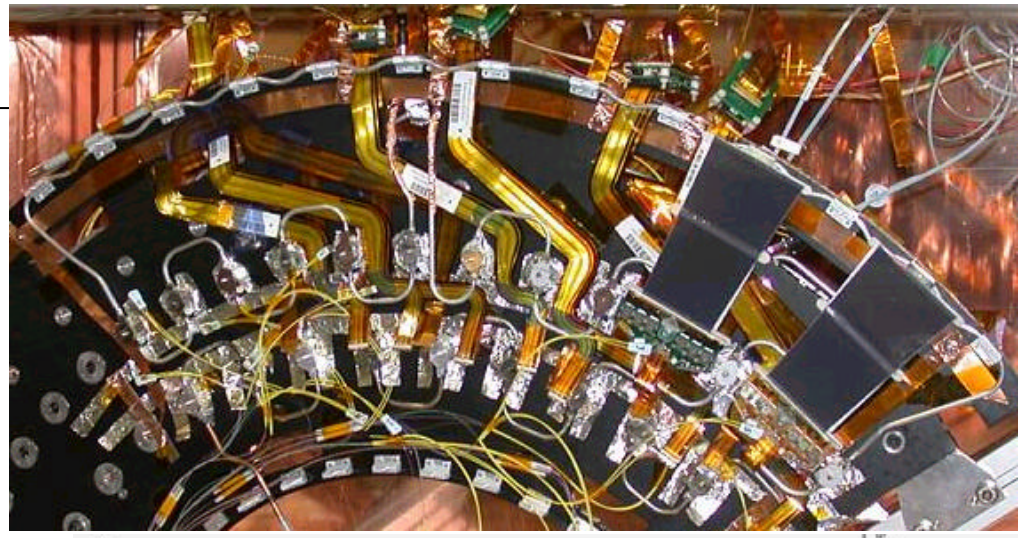
- 2 middle and 4 outer modules measured on the system test disk
- Ned‘s grounding scheme
- no significant difference between individual and collective operation

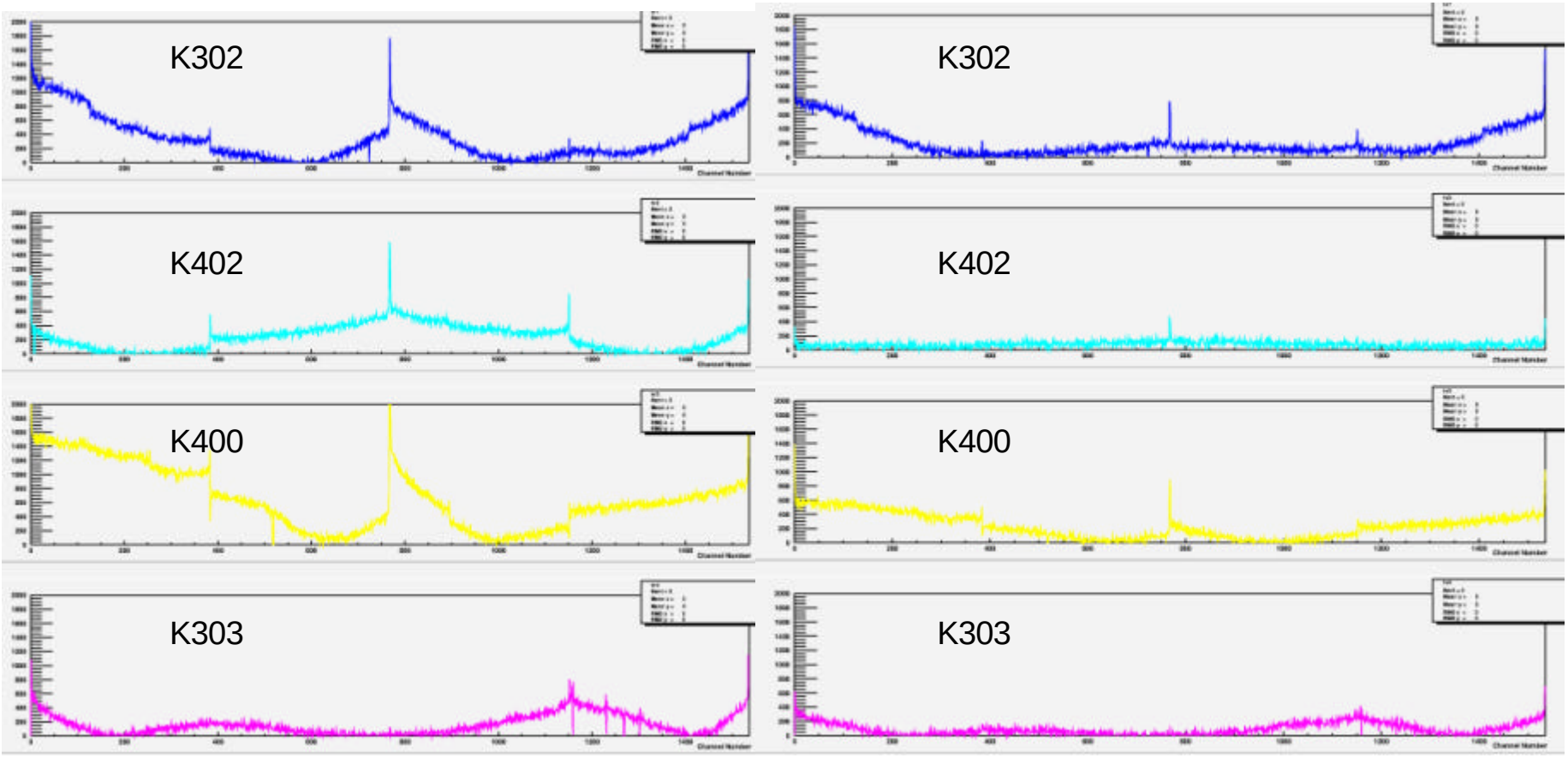


- common mode noise below 150 electrons on any chip (to be added in quadrature)

noise injection studies

- PRELIMINARY!
- 50 mA at 6 MHz through cooling pipe
- with full shunt shield (Ned‘s scheme) path of cooling pipe visible in excess noise plots
- with cooling block shorted to AGND on K402 effect is much reduced





Next Steps

- finish module assembly
  ✍ supply with spines and ASICs (and therefore hybrids) on critical path
- review experience gained during module assembly at Manchester, Valencia, Freiburg, Geneva, NIKHEF, and MPI
- evaluate the different grounding schemes at system test
- thermo-mechanical results
- irradiation of modules, thermal and electrical tests
- beam test
- May 7/8: meeting at CERN to review the results
- FDR documentation: (main) authors assigned, work has started where possible
- try to get results ready by Valencia meeting
- at least 2 institutes do not want to fix an FDR date now

beyond FDR

- assembly site qualification:
  - 5 dummy modules per site ✍ 35 in total
  - 5 real modules per site ✍ 35 in total
  - ASICs: 28 perfect + 7 1-dead-channel pre-production chip sets reserved for „real modules“
  - detectors: available (after additional orders)
  - spines: MPI / ITHEP
  - fanins: CNM / Barcelona
  - washers: Manchester
  - hybrids: Freiburg / Industry

- ~4 month between order and delivery of assembled hybrids, other components probably faster
  ✍ should components (~100 pieces) for site qualification be ordered before FDR?

- ~6 month (depending on tendering) between FDR/PRR and start of production module assembly

- module assembly takes 20 month