Endcap Systemtest Report

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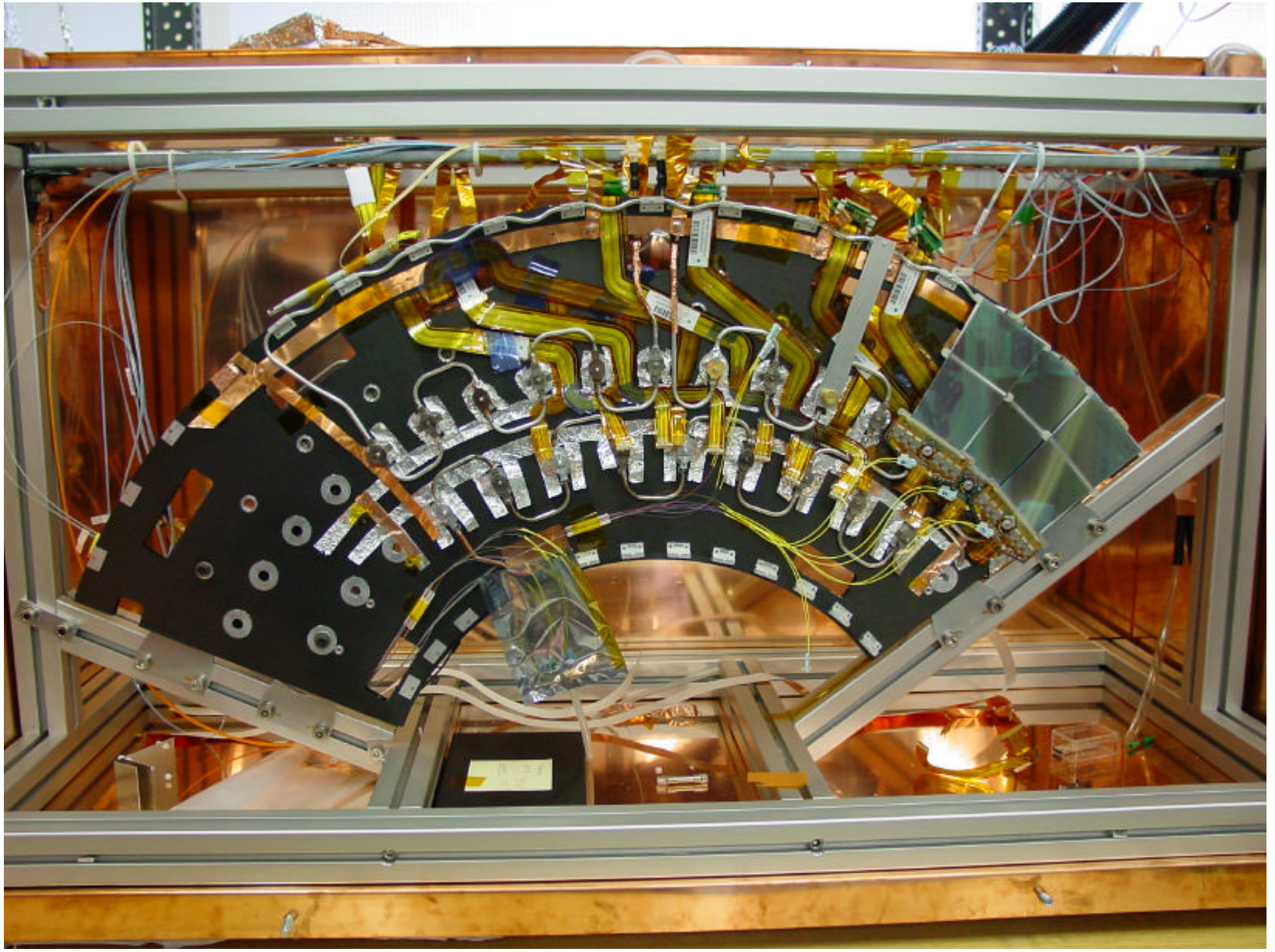
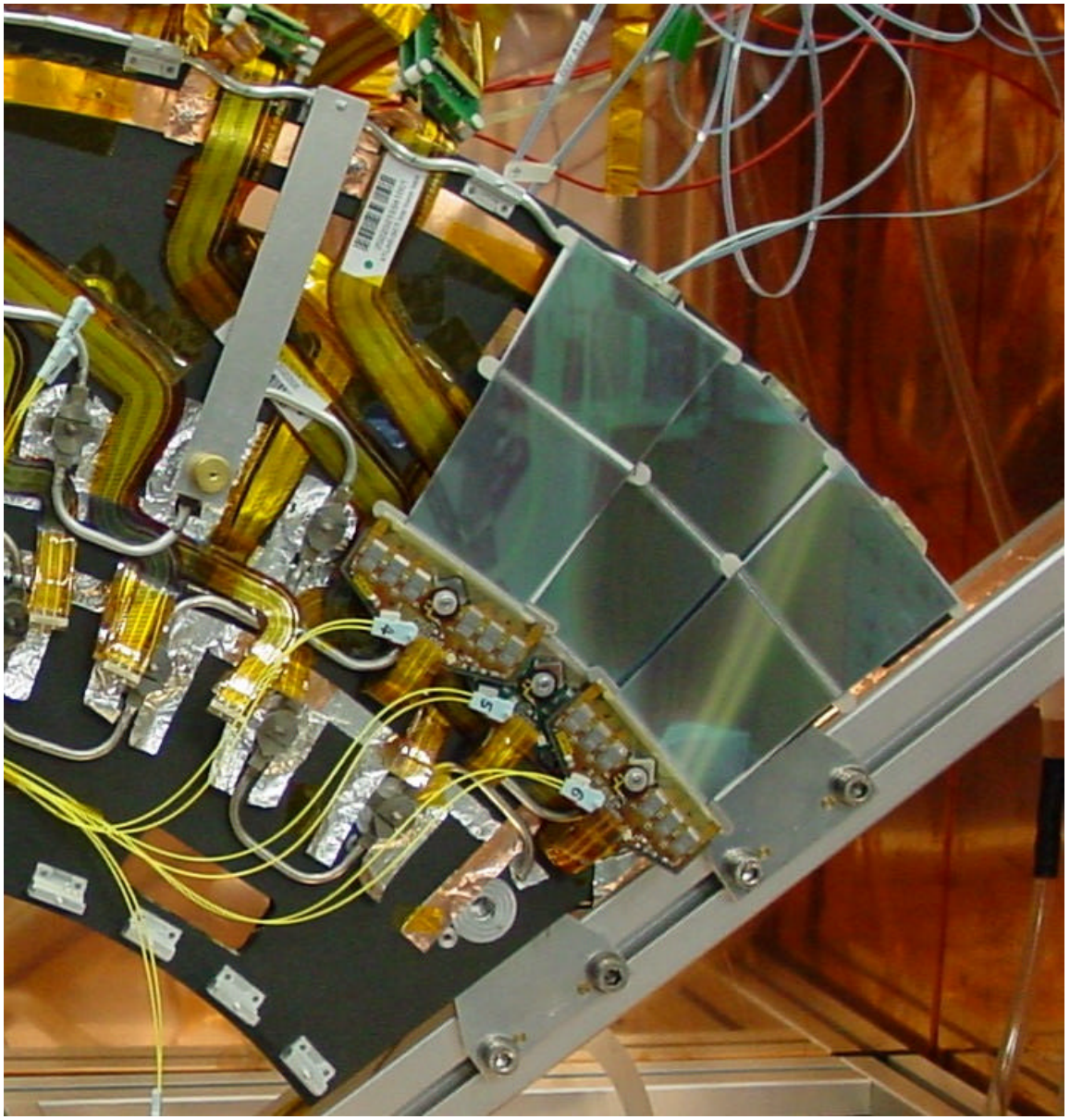
Forward Systemtest Report

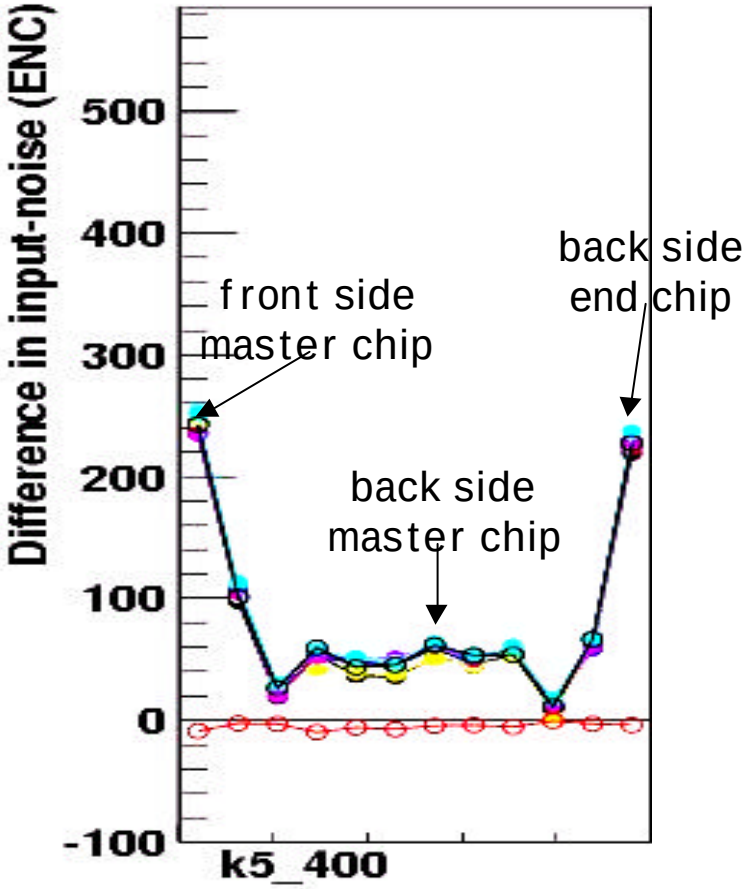
- Description of system (3 outer modules)
- Noise vs. bias time
- First comparisons of performance of grounding/shielding schemes
  - using shunt shields
  - with shunt shields shorted





Measurement Technique

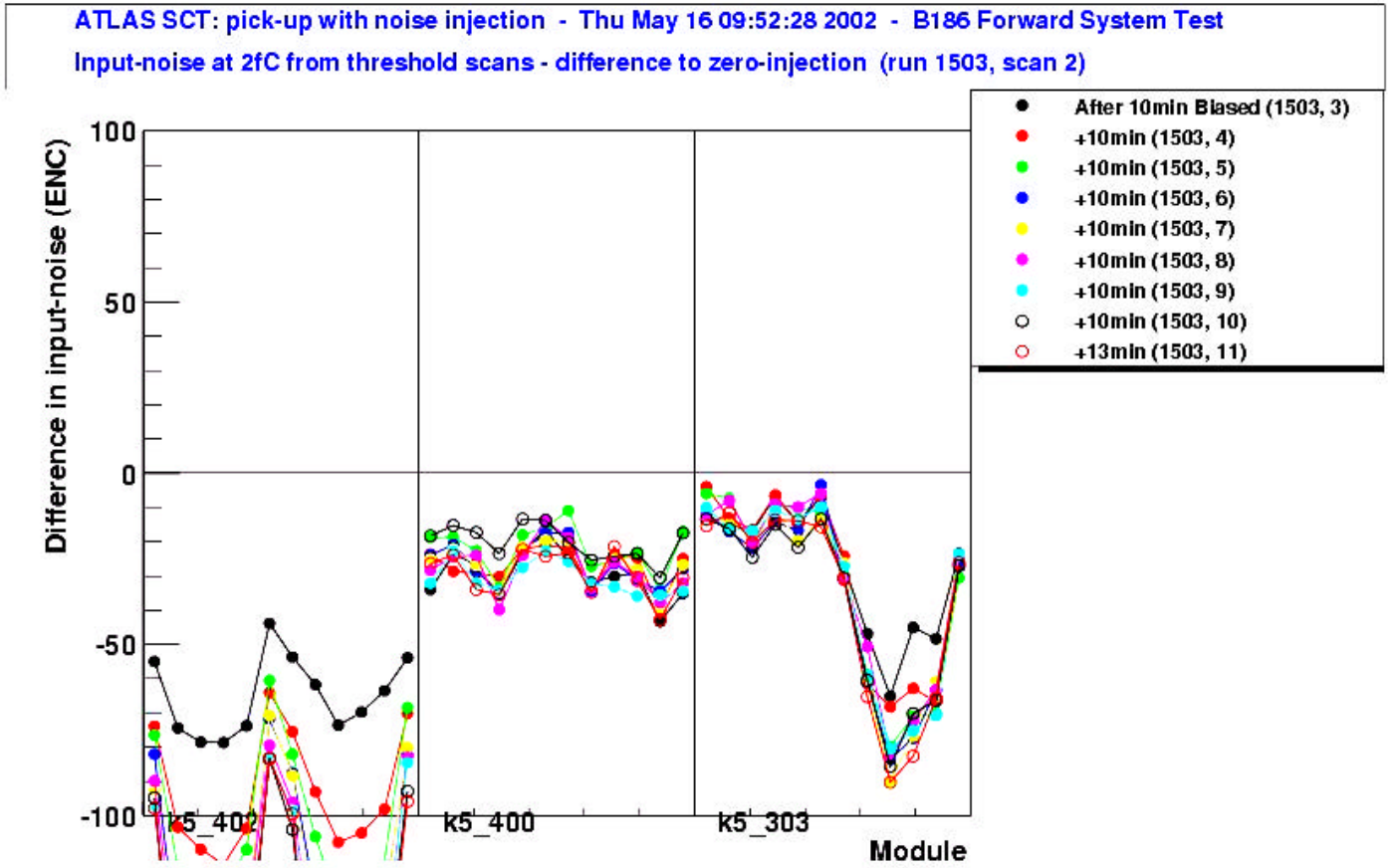
- Single threshold scans with 2 fC injected charge:
  - reference scan
  - scans under condition being studied
- Assume gain = 55
- Plot noise difference with respect to the reference.



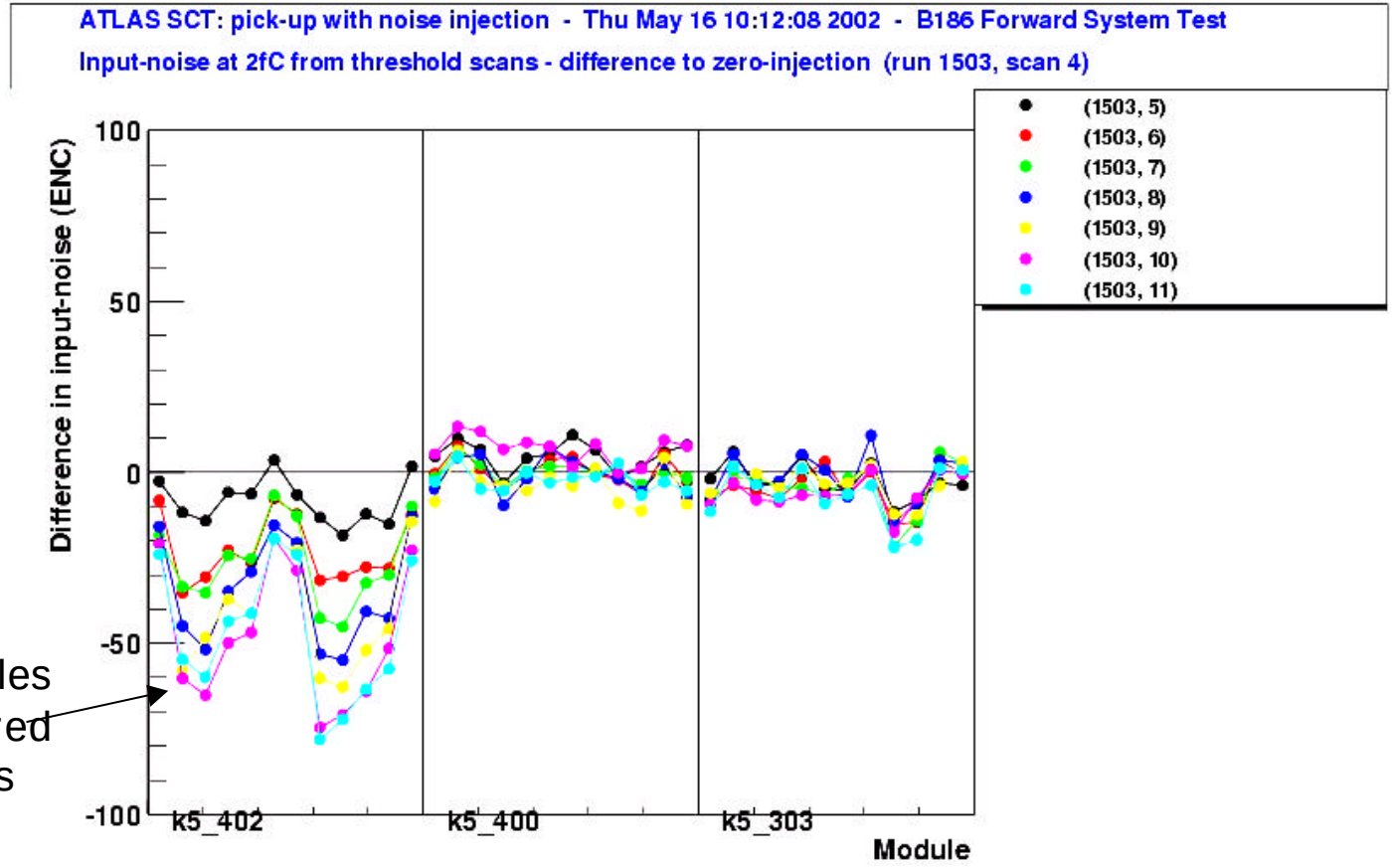
Noise vs. Bias Time

- Reference scan taken immediately after HV ramped up
- Further scans every ten minutes until noise is stable
- Plot on next slide…

Noise vs. Bias Time



Last 8 Scans from Previous Slide:

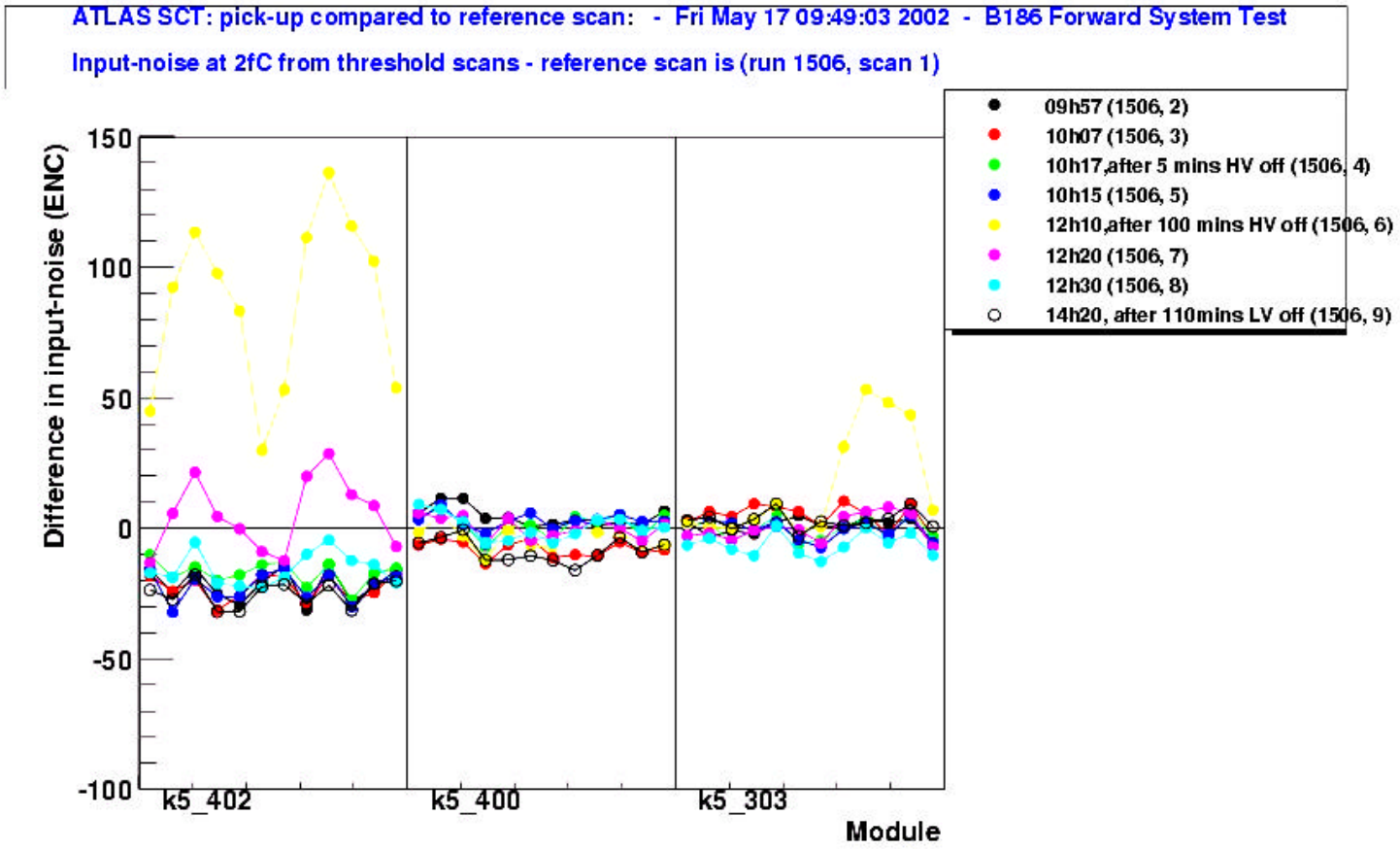


Pink curve: modules have been powered for 80 minutes

HV or LV ?

- Powered modules, waited ~ 1 hr
- Then took scans every 10 minutes until noise 'settled'
- HV off 5 minutes
  - next scan: noise still low
- HV off ~100 minutes
  - next scan: noise high again, then decayed
- LV off ~100 minutes
  - next scan: noise still low

HV – not LV.


ATLAS SCT: pick-up compared to reference scan: - Fri May 17 09:49:03 2002 - B186 Forward System Test
Input-noise at 2fC from threshold scans - reference scan is (run 1506, scan 1)
09h57 (1506, 2)
10h07 (1506, 3)
10h17,after 5 mins HV off (1506, 4)
10h15 (1506, 5)
12h10,after 100 mins HV off (1506, 6)
12h20 (1506, 7)
12h30 (1506, 8)
14h20, after 110mins LV off (1506, 9)
Difference in input-noise (ENC)
150
100
50
0
-50
-100
k5_402
k5_400
k5_303
Module

Noise vs. Bias Time - Conclusions

- Significant decrease in noise vs. bias time observed on some endcap modules
- Magnitude and time constant of the effect variy from module to module
- Effect tends to be worse at centre of module, milder at edges
- Unlikely to be problem for atlas operation, but:
  - should be kept in mind when testing modules
    - reproducibility of results !
  - may affect QA?

Grounding and Shielding on the Systemtest Sector

- Continuous shielding of all cables and tapes
- Common-mode chokes at PPF2
- Capacitors from (almost) all lines to shield at PPF1
- Sector enclosed in a solid copper box (“thermal shield”)
- Interconnected Foil Rings on Disk:
  - at outer radius
  - at each ring of cooling blocks
- Thermal shield, support frame, disk skins, foil rings, cable shield and cooling circuit all connected together near PPF0

G&S on sector, cont'd

- NB have recently found and fixed several problems in general shielding:
  - gaps in cable shielding
  - dodgy connections between cable shield sections
  - missing capacitors at PPF1
- Every fix has yielded improved
  - performance
  - reproducibility
- Probably there are more problems that we haven't found yet.

→ Results are Preliminary !

Grounding Options

"Shunt Shields In"

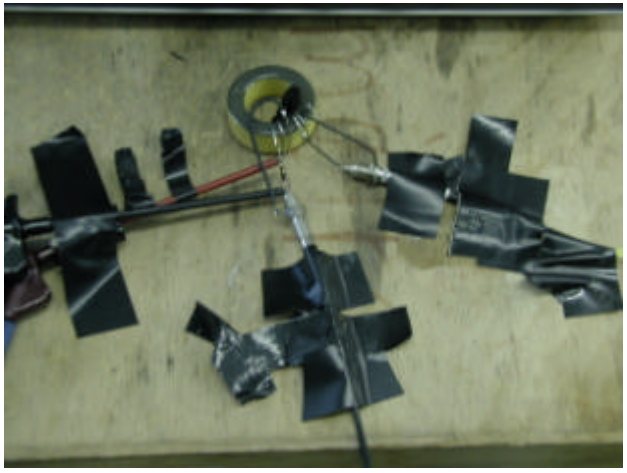
- cable shield AC-tied to VME crate ground
- cable shielding stops at thermal enclosure
- all modules' DGNDs connected to shield at PPF0

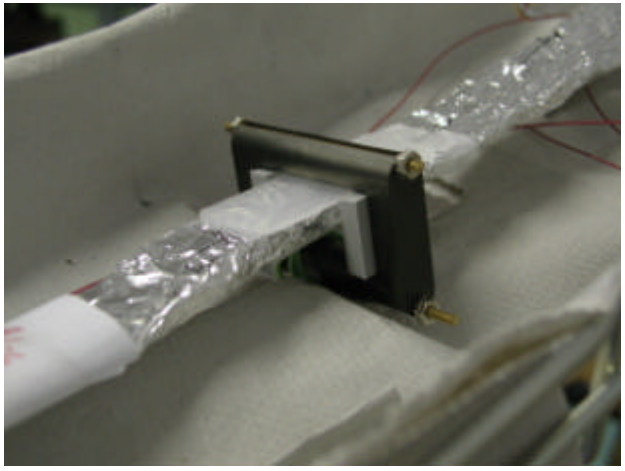
"Shunt Shields Shorted"

- cable shield AC-tied to DGND at VME
- cable shielding continues to PPF0
- all modules' DGNDs connected to cooling circuit via blocks

Noise Injection Techniques

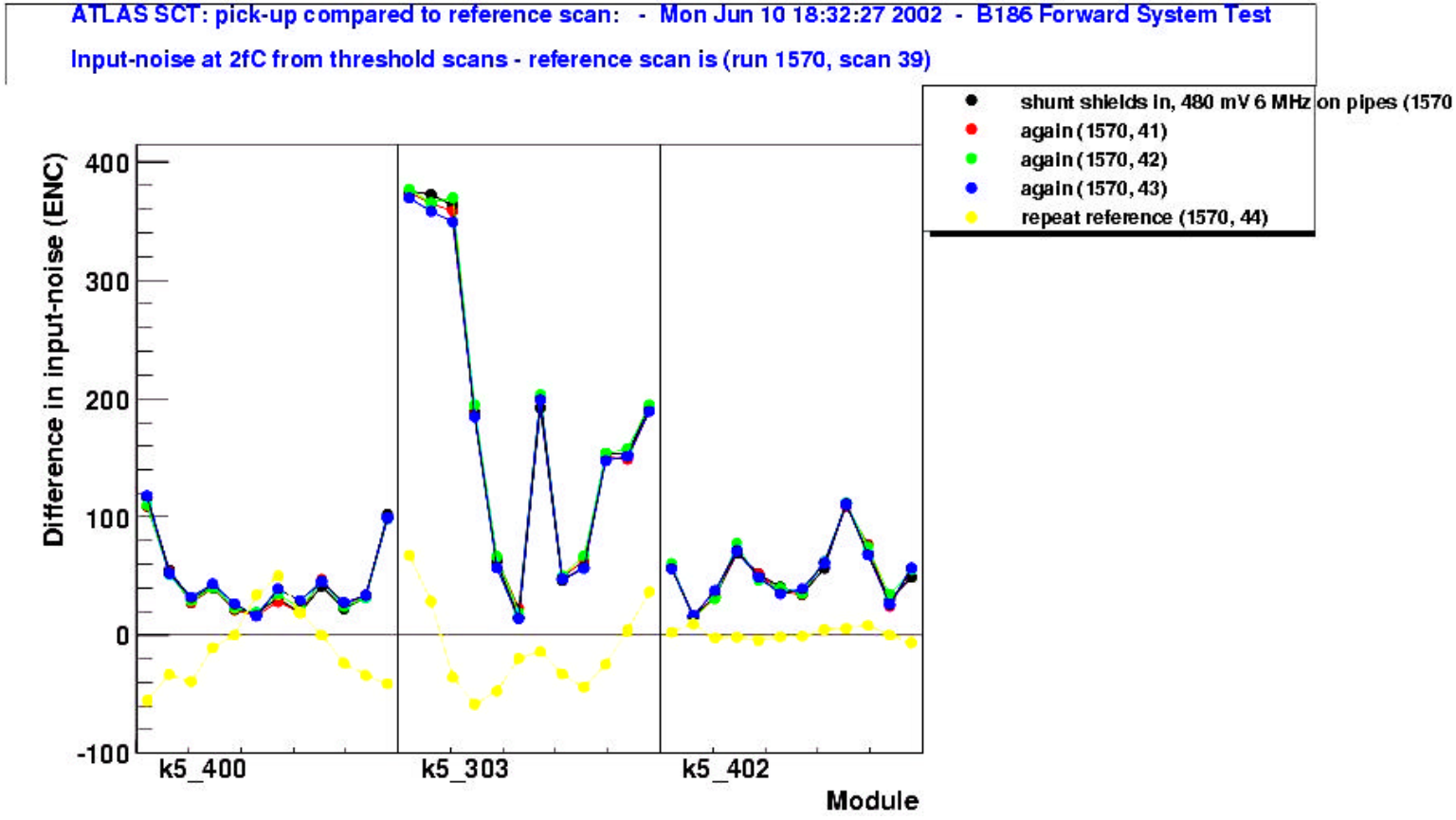
- Sine wave (10V_{p-p}, 6 MHz) injected, via coil about ferrite ring, onto cooling pipe
  - injected signal ~400 mV_{p-p}



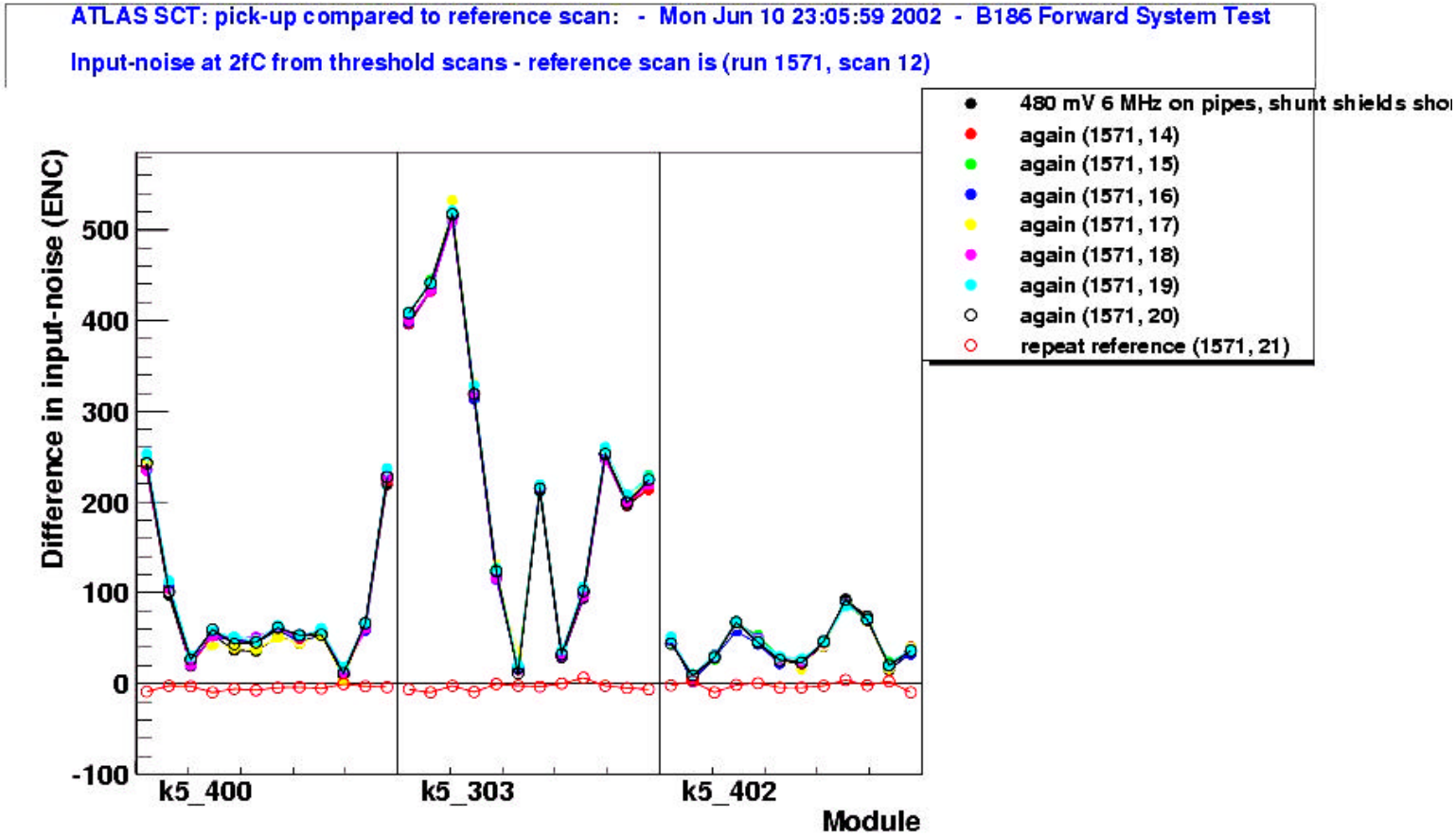


- Sine wave (8V_{p-p}, 6 MHz) injected, via coil about ferrite ring, onto power tapes
  - over shielding
  - between PP1/PP2, near PP1

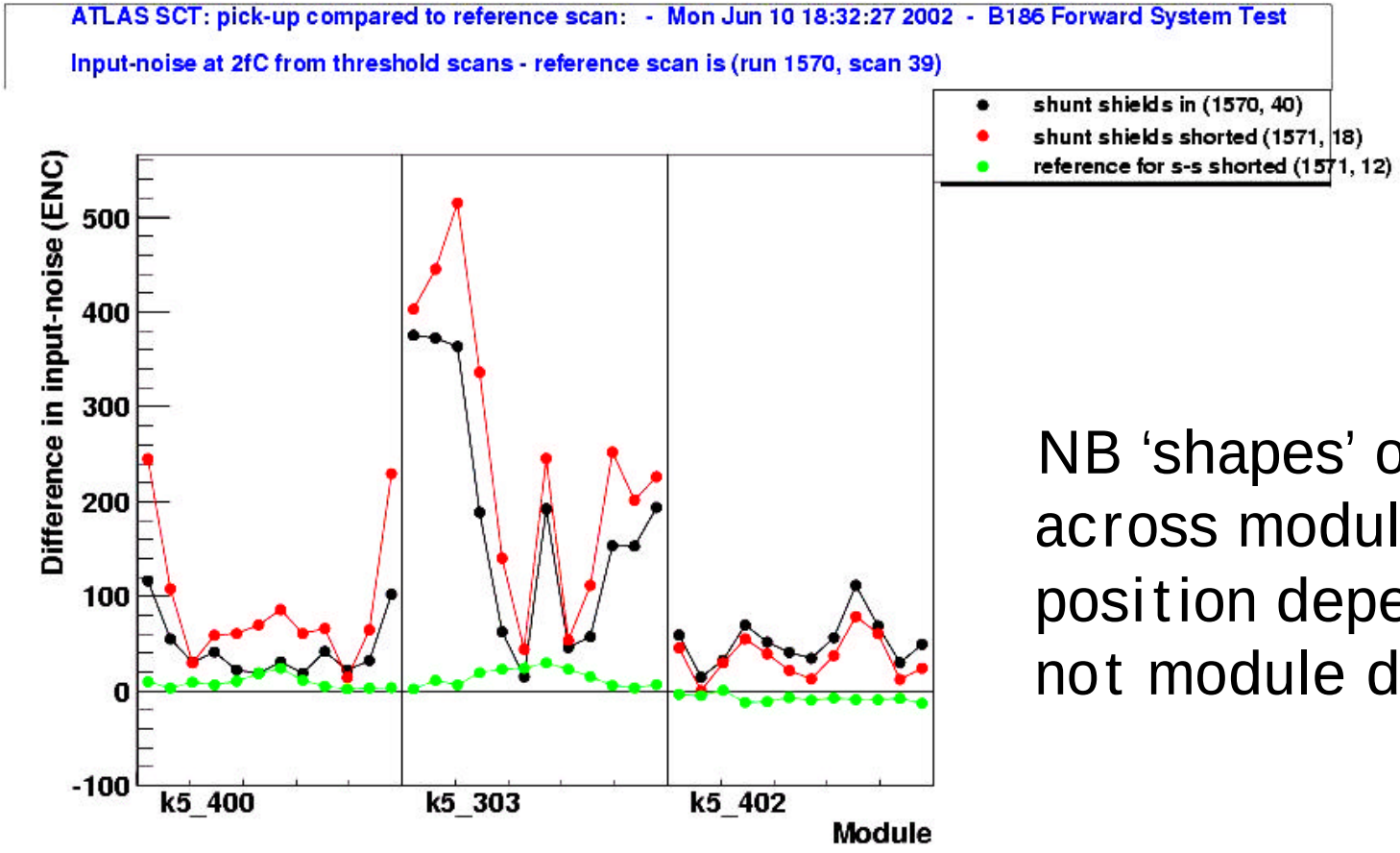
Injection onto Pipe, Shunt Shields In



Injection onto Pipe, Shunt Shields Shorted

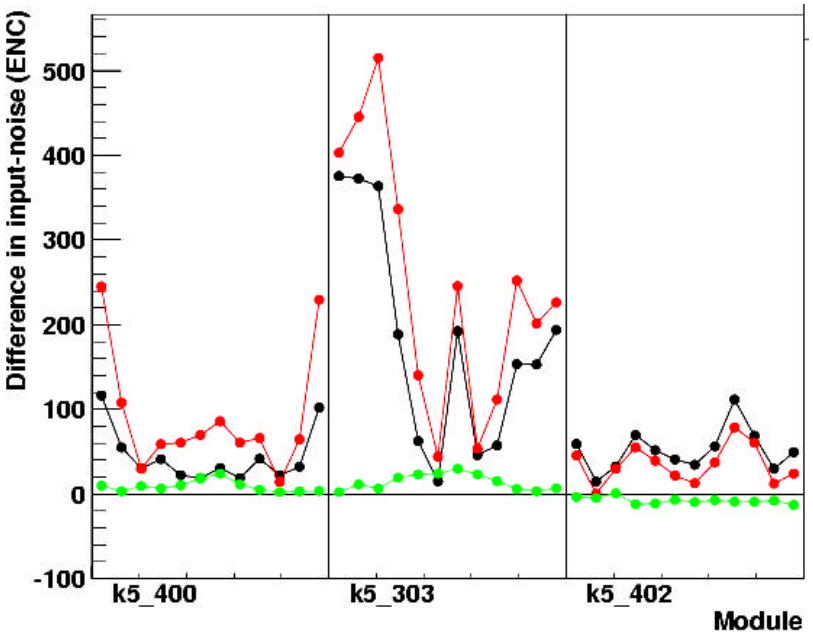


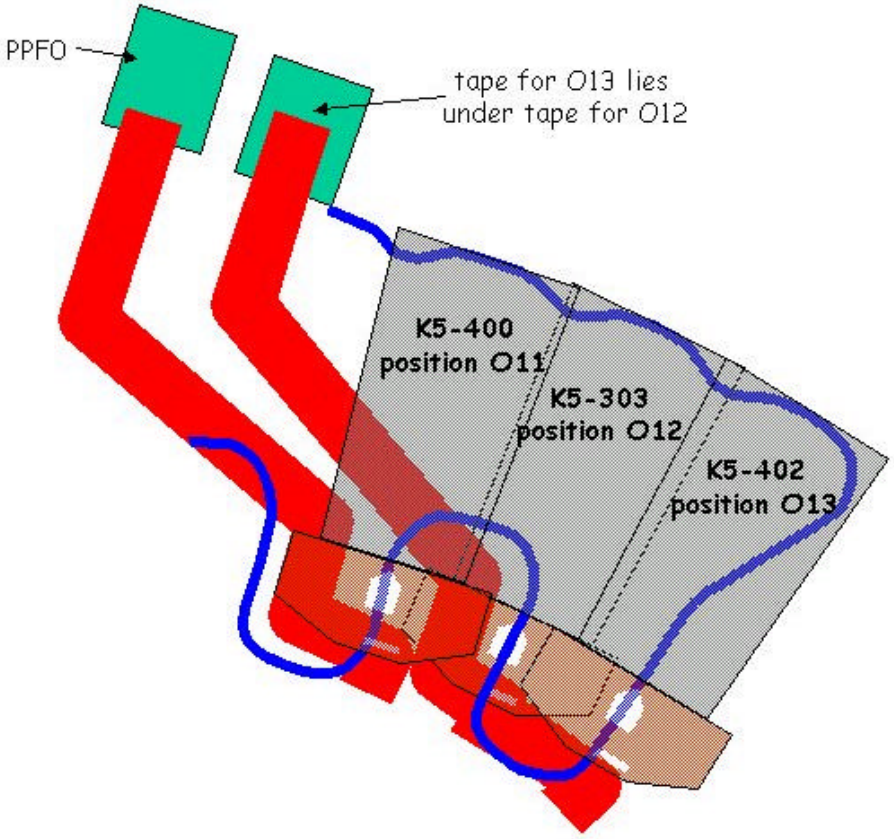
Injection onto Pipe, comparing results from 2 ground schemes



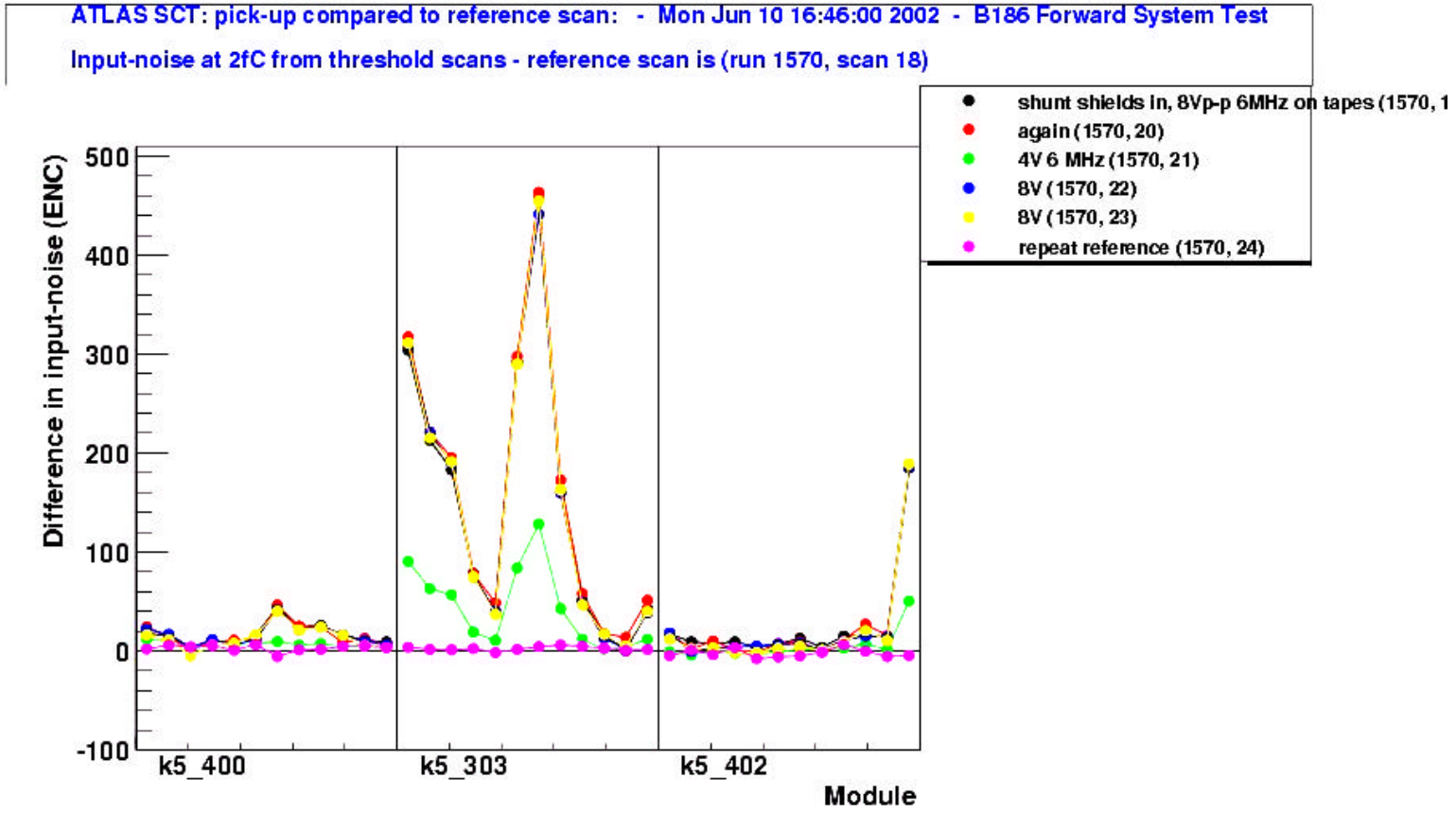
NB 'shapes' of pickup across modules are position dependent, not module dependent

Pipe/Tape/Module Layout

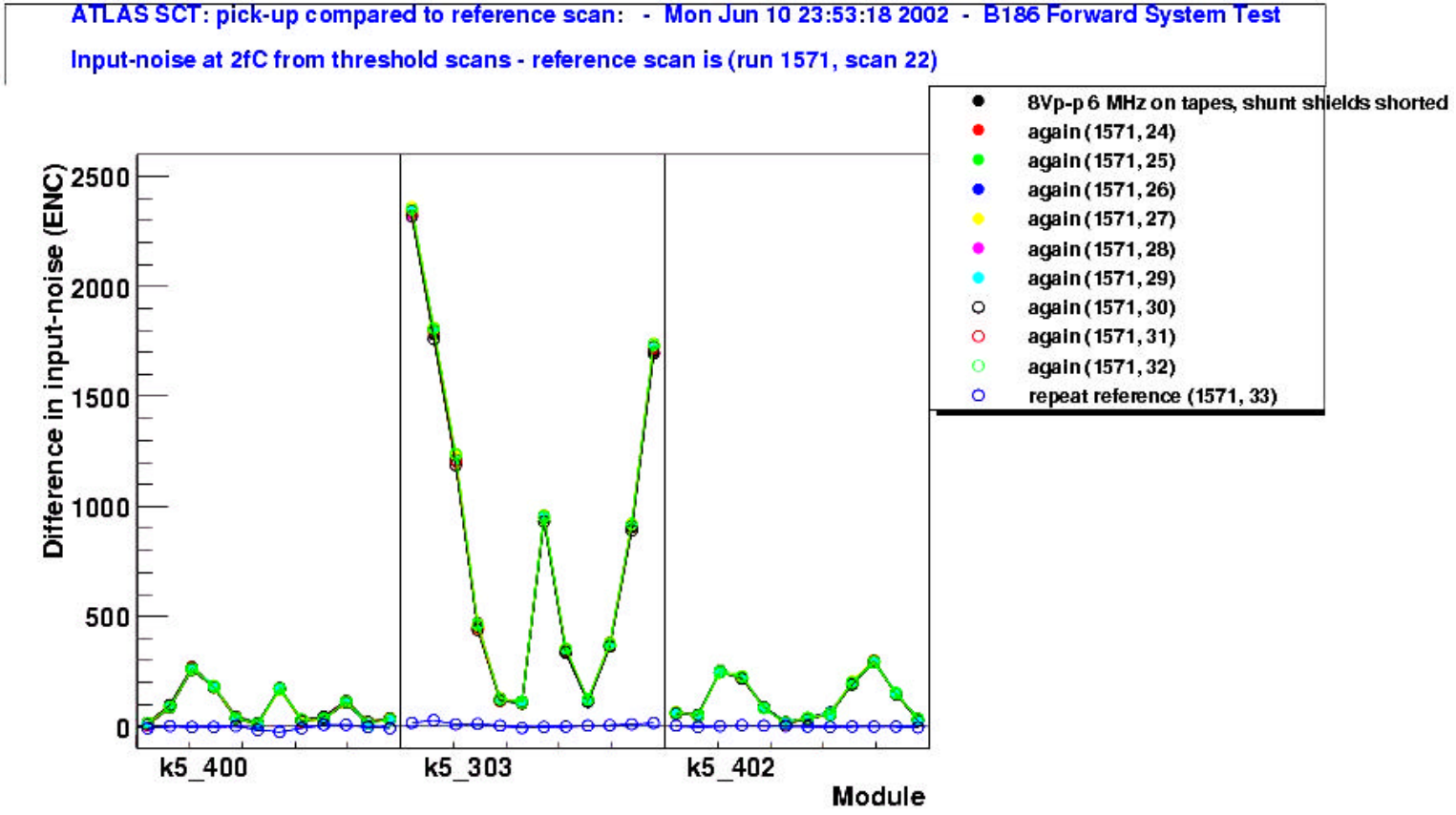




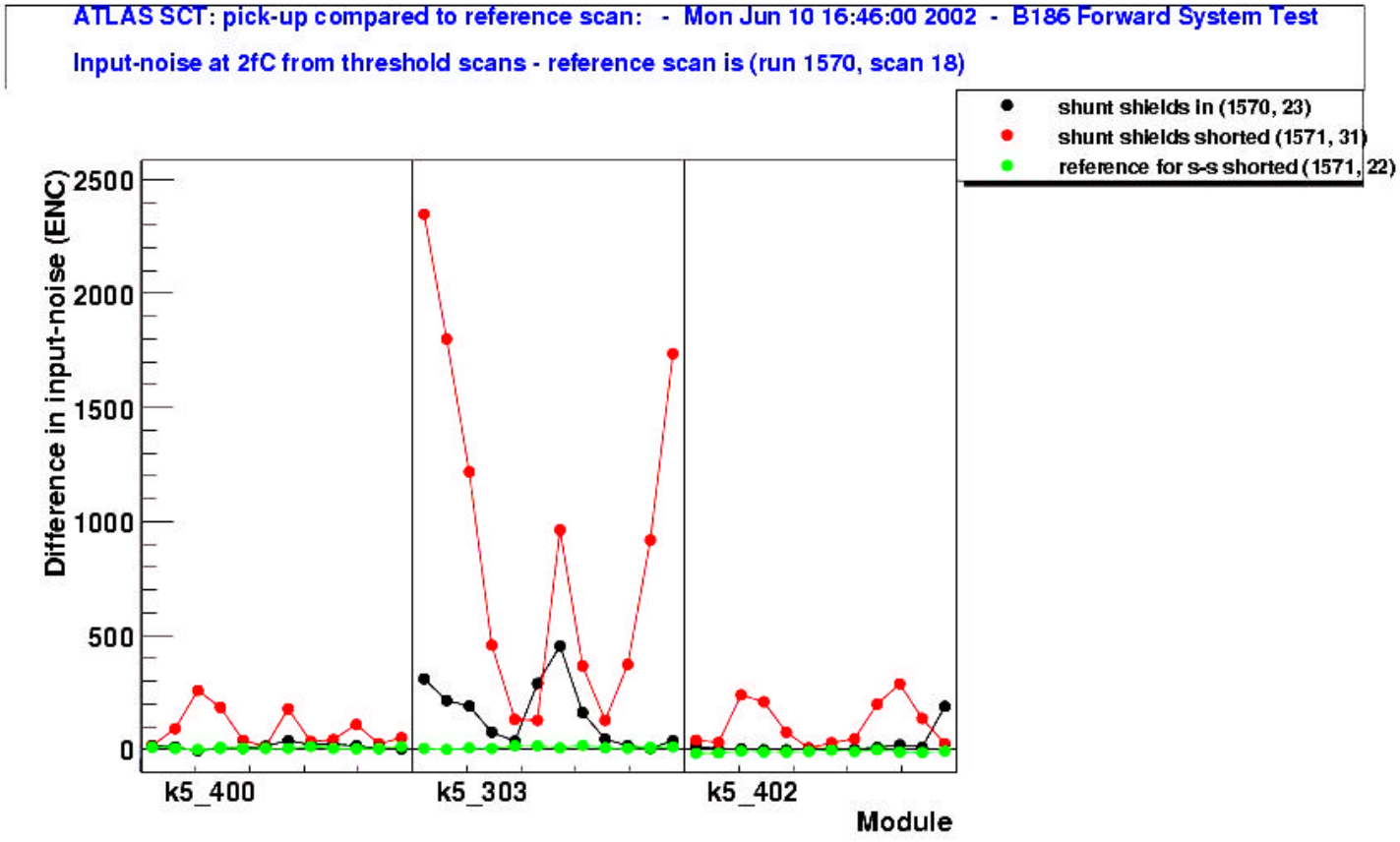
Injection onto Tapes, Shunt Shields In



Injection onto Tapes, Shunt Shields Shorted



Injection onto Tapes, comparing results from 2 ground schemes



Ground Scheme Comparison Summary

- With setup as it is now:
  - The 2 ground schemes are ~ equally good at rejecting noise injected onto cooling pipe
  - Shunt-shields-in ground scheme does better job of rejecting noise injected onto power tapes
- NB still working to improve shielding in general…