

APEX 08

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Hardware Update and Plans

- BPM hardware/feedthru repair
- BBQ system
- Hybrid tracker
- IPM hardware
- Bunch by Bunch Turn By Turn monitor
- Gated BBQ development

BPM hardware

- BPM ring is 100% populated w electronics, 15 spare boards...
- Opto replacement is complete, feedthru repair complete
- 75 feedthrus were replaced out of 350
- Existing feedthrus develop loose pins and corrosion – manufacturing flaw of the solder connection?
- 64 were “bad” – we thought we had 45 open channels going into the shutdown...originally we thought the problem was inside the vacuum system....
- A TDR of the ring yielded 14 more problems, 5 more were discovered by Todd as “bad data”.
- New design is much more robust.... We hope...Welded pin
- All 16 snake BPMs were replaced..5 had already failed....
- 11 were replaced “preemptively” – we have spares.....
- We still have a few cables that need to be fixed. It’s a combination of new cables needed or fix the end connections. In process....
- Also we are installing two new dual plane BPM’s for the AC dipole.
- Plan is to instrument 1 plane in each... for now

BPM feedthru picture – comparing new and old

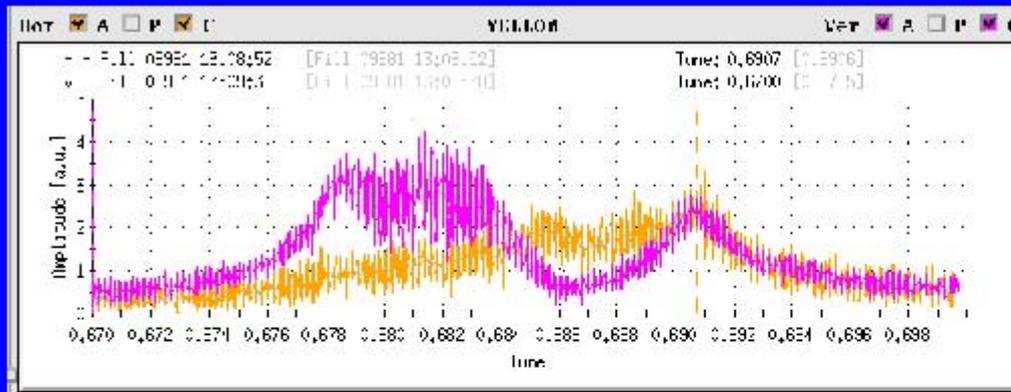


BBQ system

- We have to re-learn and document what we find...Expert operators are still here.
- Michelle and Craig are working on the AFE hardware etc. Larry and Jonathan in controls....
- Documentation into the design room – schematics and block diagrams, simulations
- “Fixing” the design topology
- Clean up cabling, add covers and front panels.....
- Remove unused/un-needed equipment
- Simulations and bench measurements to verify performance – systematic approach
- Putting in test points to monitor performance AFE and kicker drive voltage
- Conspicuously avoiding disconnecting of cables for experiments whenever possible.
- Packaging the resonators as permanent text fixtures
- Important >engineering system reviews<
- As APEX – investigation of the 60 Hz problem – and noise issues
- Spares ... 4 AFEs are being built
- We want to add Spectrum analyzers as independent monitors of the system
- We are working on issues now..noise...NCO issues..
- Developing an AFE unit for AGS – Al/Michiko started this

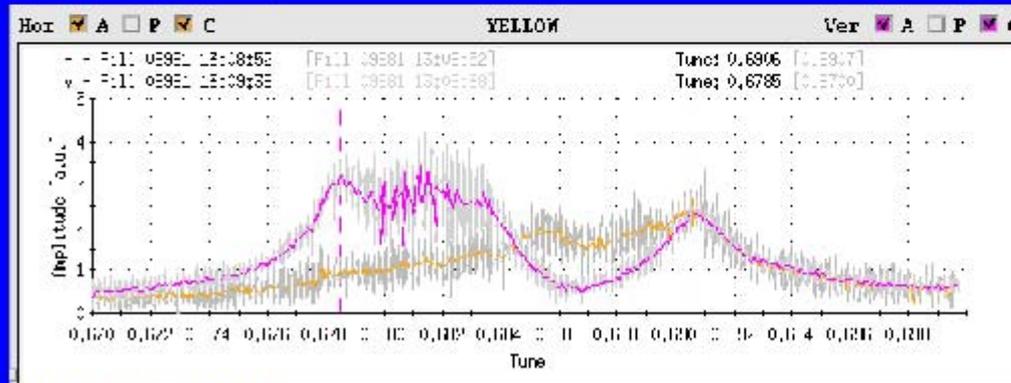
Noisy BTF

Open issues – noisy amplitude signal



raw data

[YHV filno 9981]

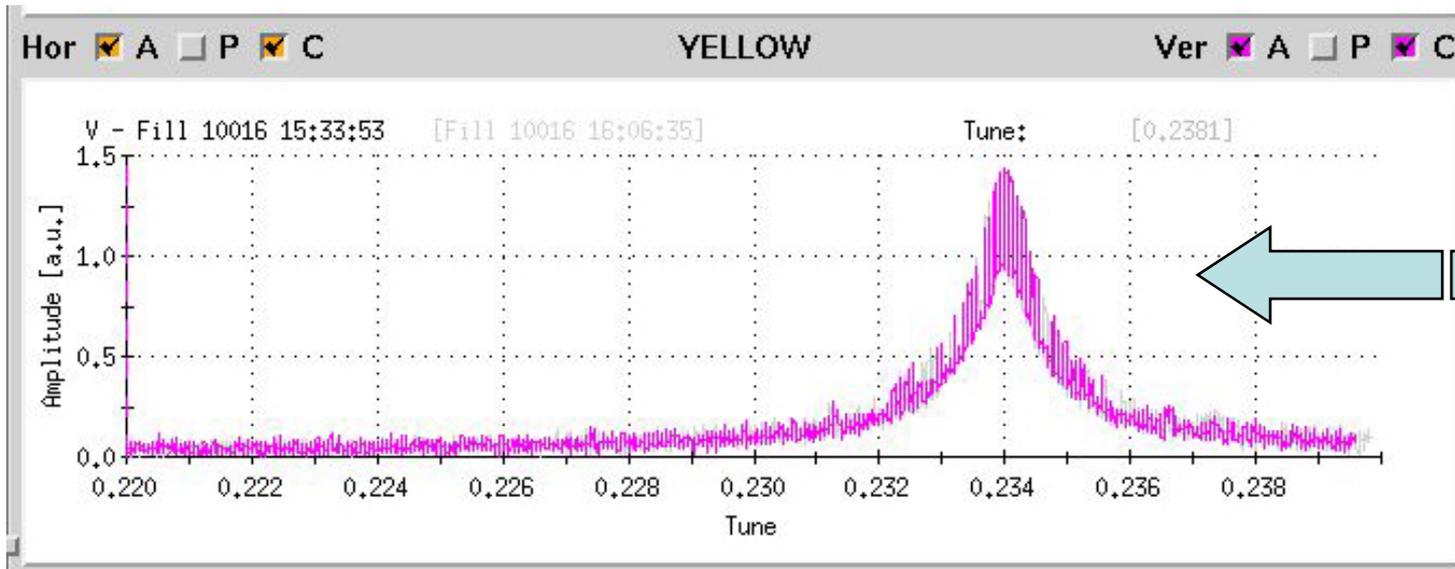


averaged
and raw data

[YHV filno 9981]

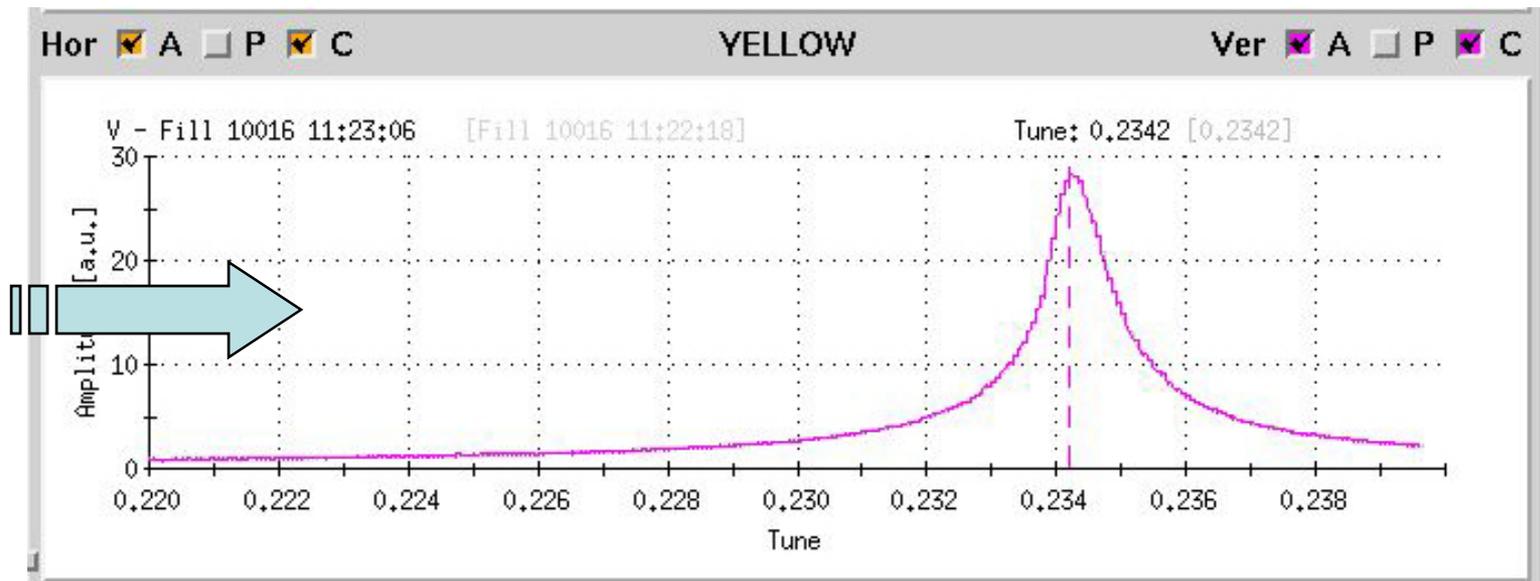
Wolfram Fischer

BTF – resonator data

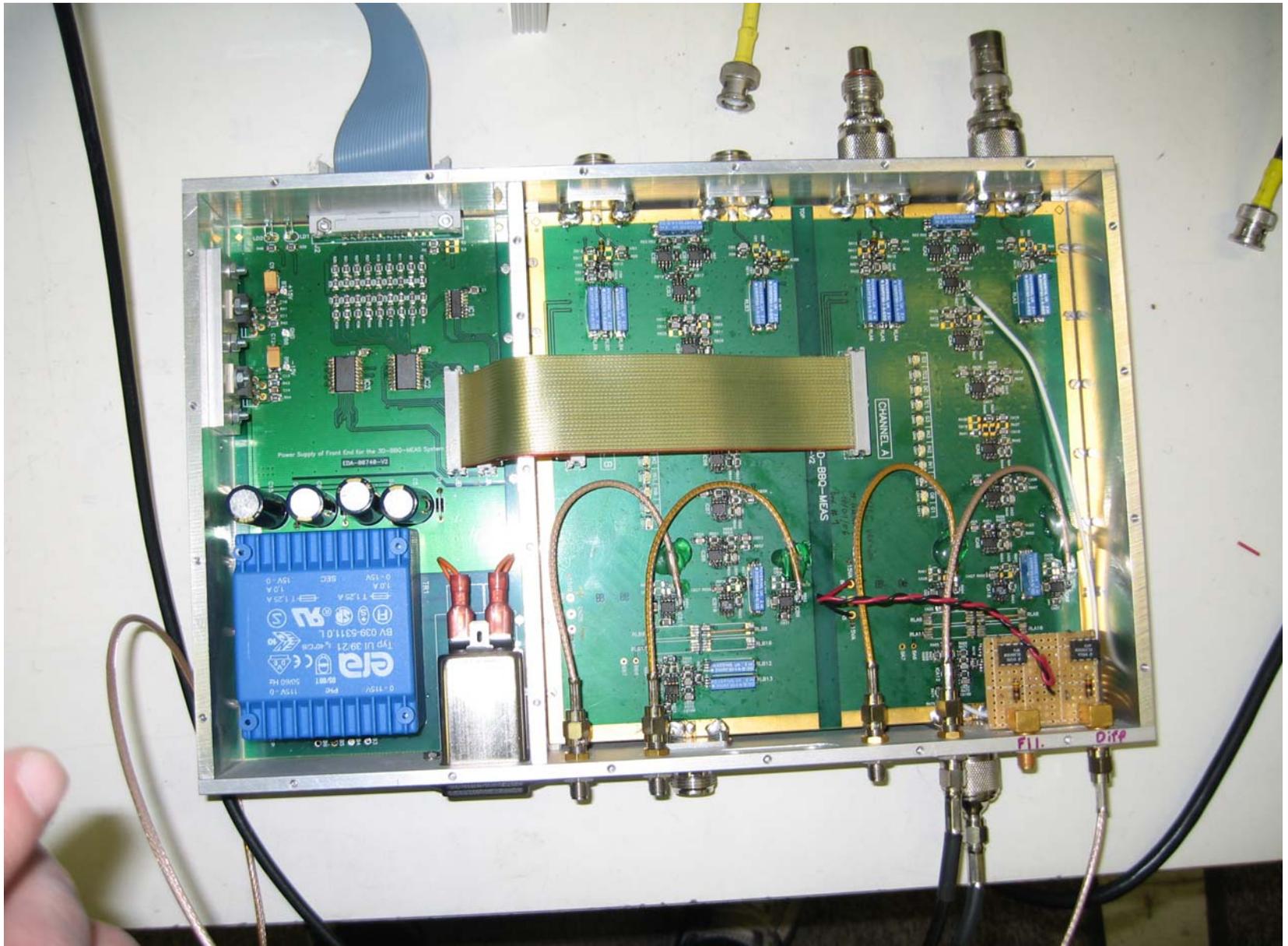


Before:
Spurious spikes on BTF results, trouble resolving tune

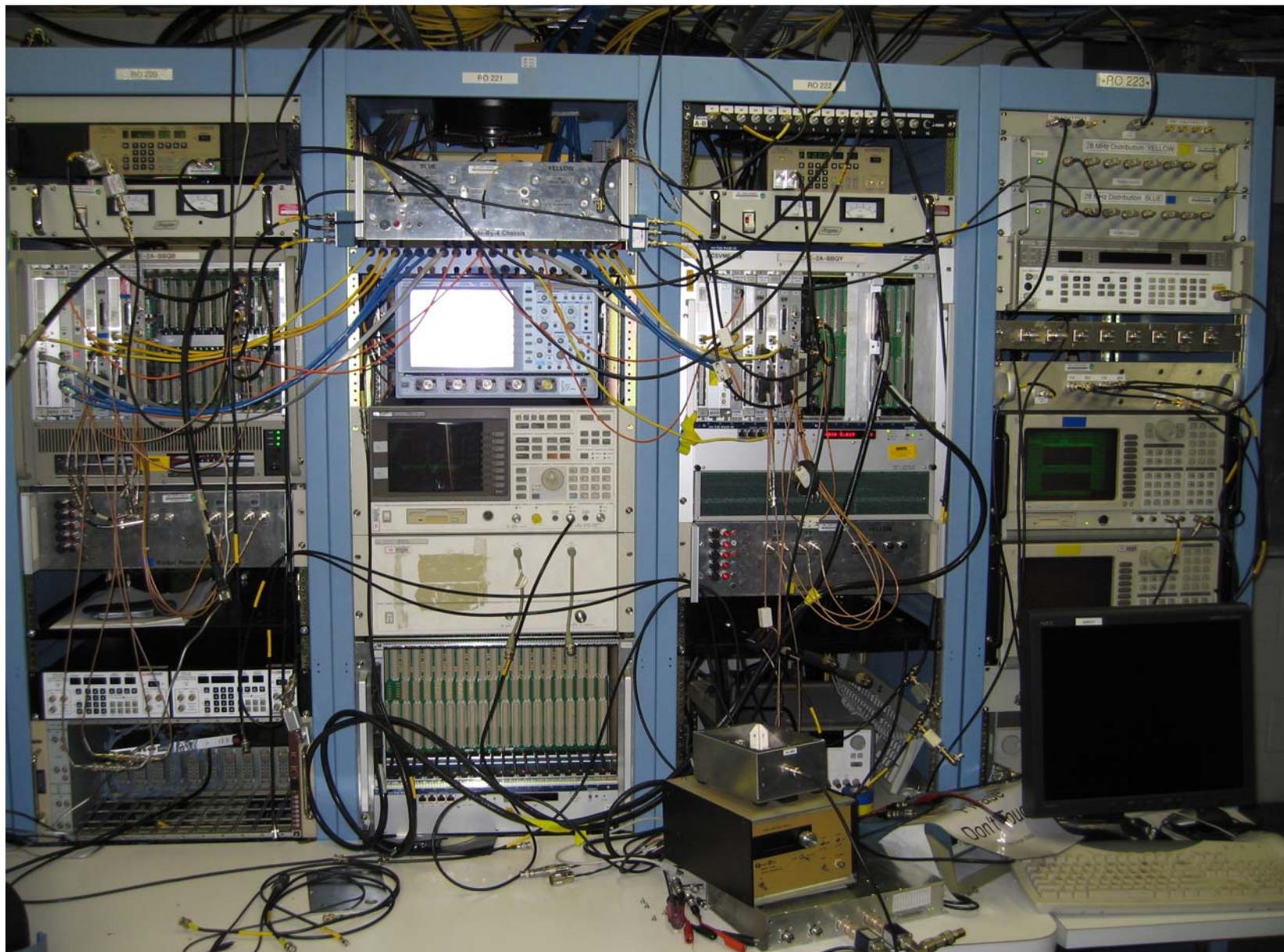
After:
Remove FIR filter race condition (Fixed by Larry Hoff)



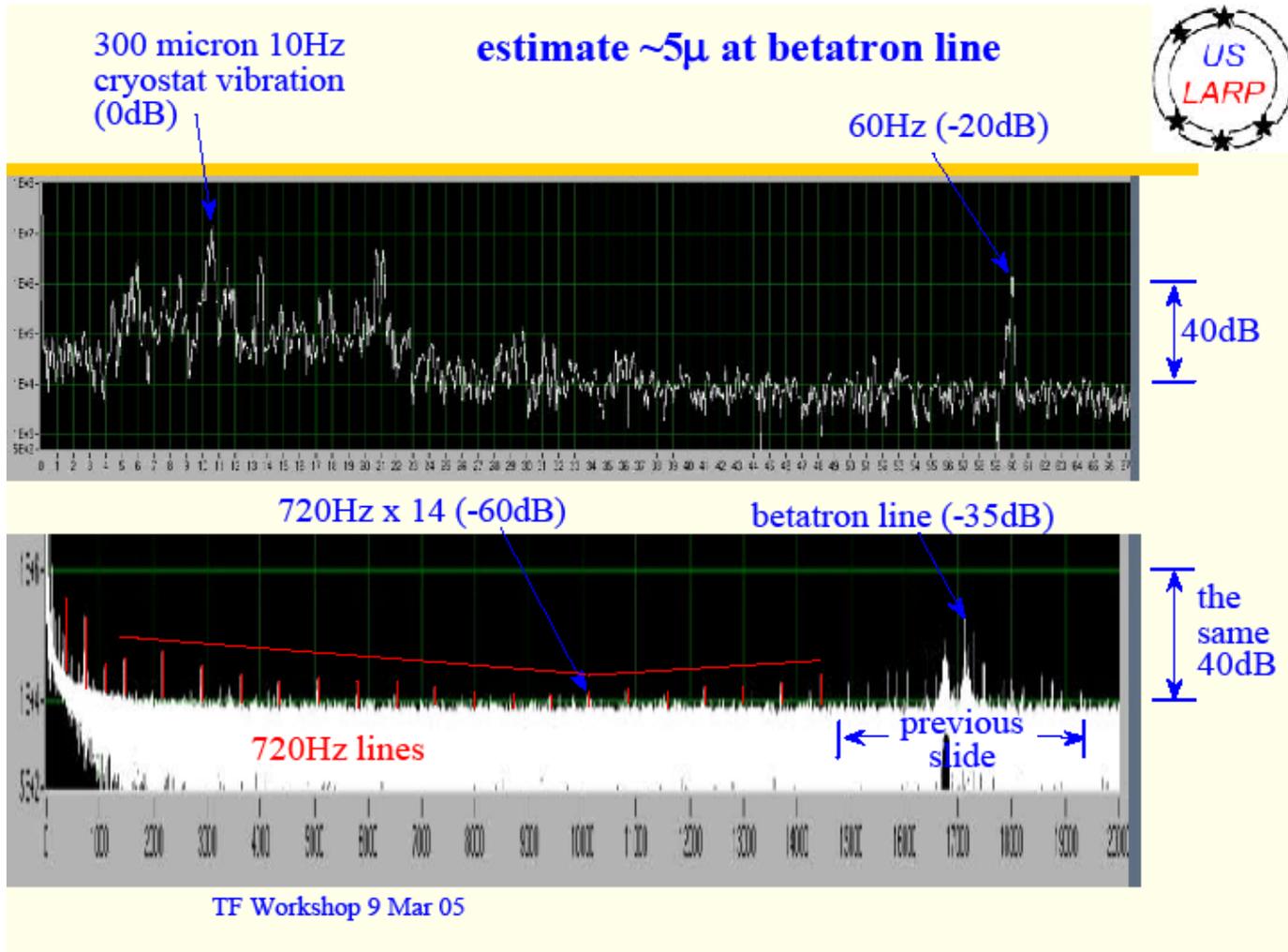
BBQ AFE – showing test points



BBQ Rack Layout – needs to be cleaned up and documented



BBQ Pete's spectrum picture – 60 Hz lines interfere with tune tracking
We need to ameliorate the 60Hz problem or develop another method
The hybrid...



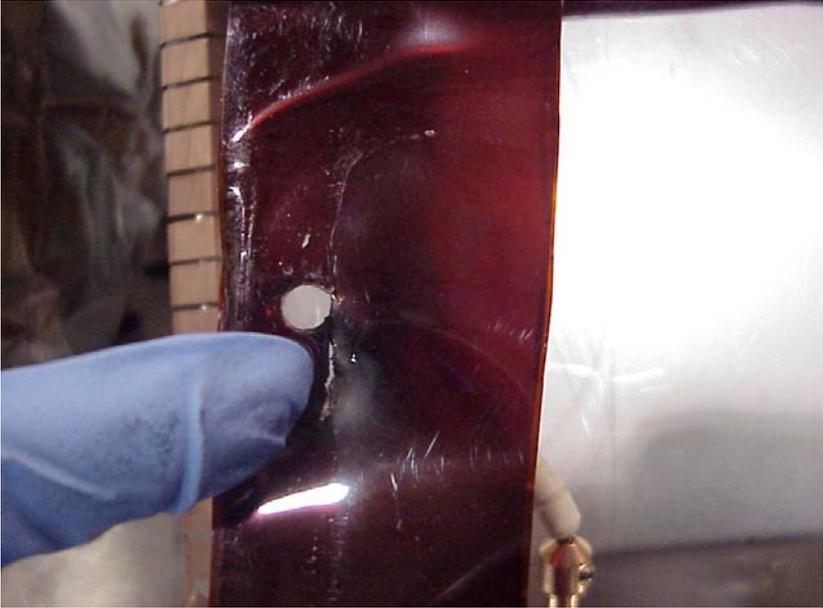
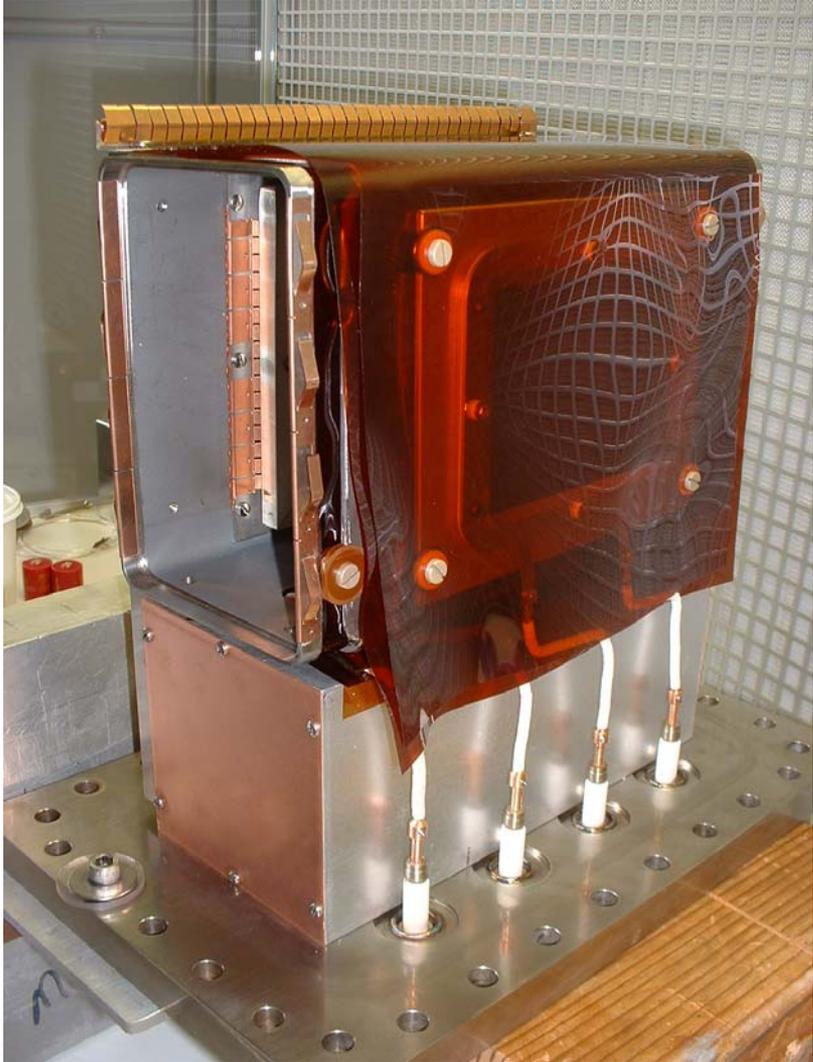
Hybrid system

- Advantage it is immune to the 60 Hz problem
- To properly develop this device – without interrupting the present BBQ system - build a test setup using “hot spares”
- May need a custom AFE
- Conspicuously avoiding disconnecting of cables of the existing system
- We can develop the monitor portion first, then try to close the loop with the PLL – then tune track the beam....

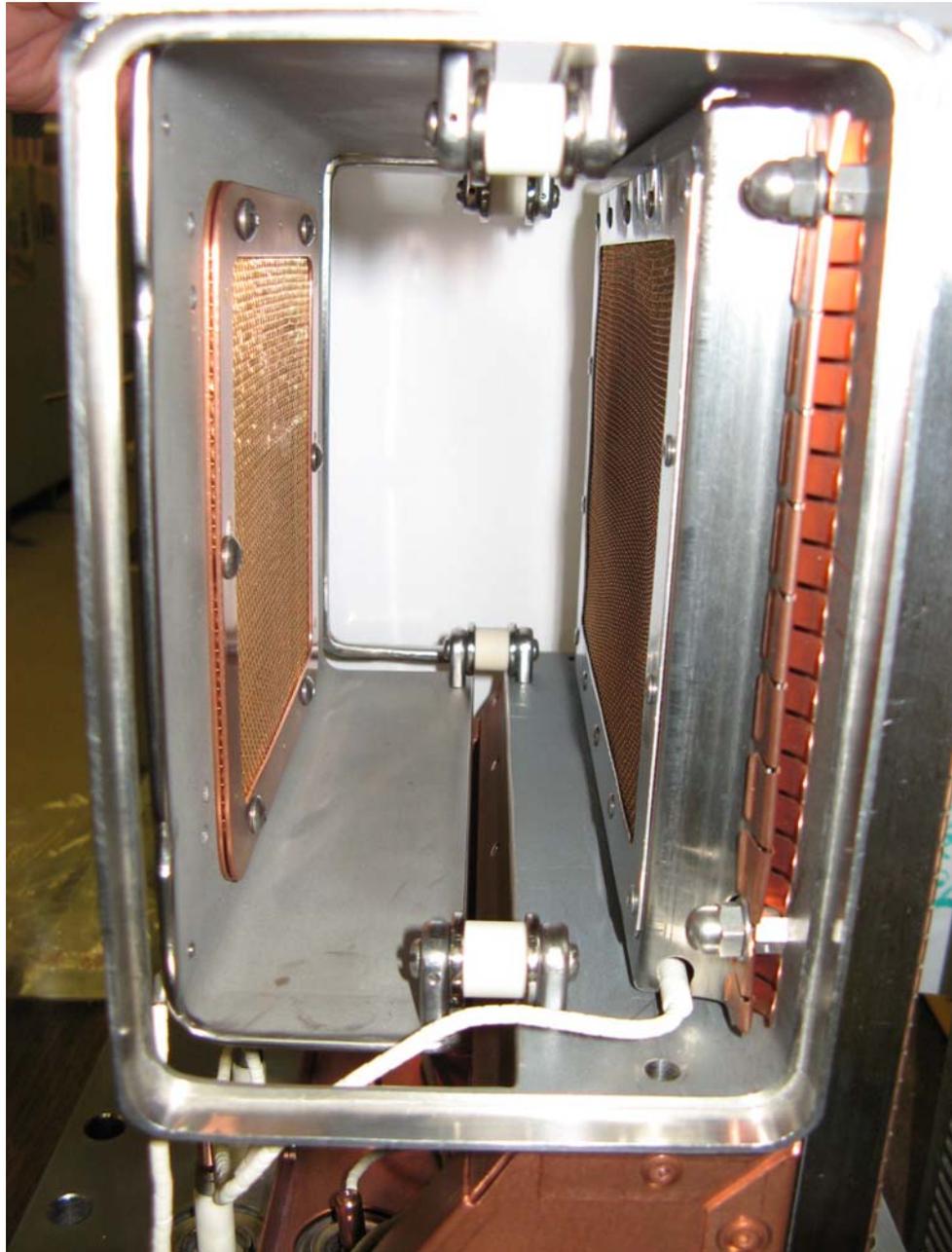
IPM upgrade

- HV failure about two years ago motivated changes....
- Last year we build a more robust device – remove kapton as much as possible
- New high voltage standoffs were used....
- Placed in YV. Ran well last year...
- Jesse/Roger develop the “final” version – places ceramics out of the beam path, fully shields micro channel plate...
- Testing circuit board to 200 C...it survived 150C bakeout
- Also we tested one “upgraded” electronics box with YV
- We have installed all new boxes for the upcoming run – better noise isolation and filtering
- The plan is to install one IPM – construction is in process
- If new a IPM is installed, microchannel plate takes a “long time” to degas
- May take some time before it is functional throughout the cycle

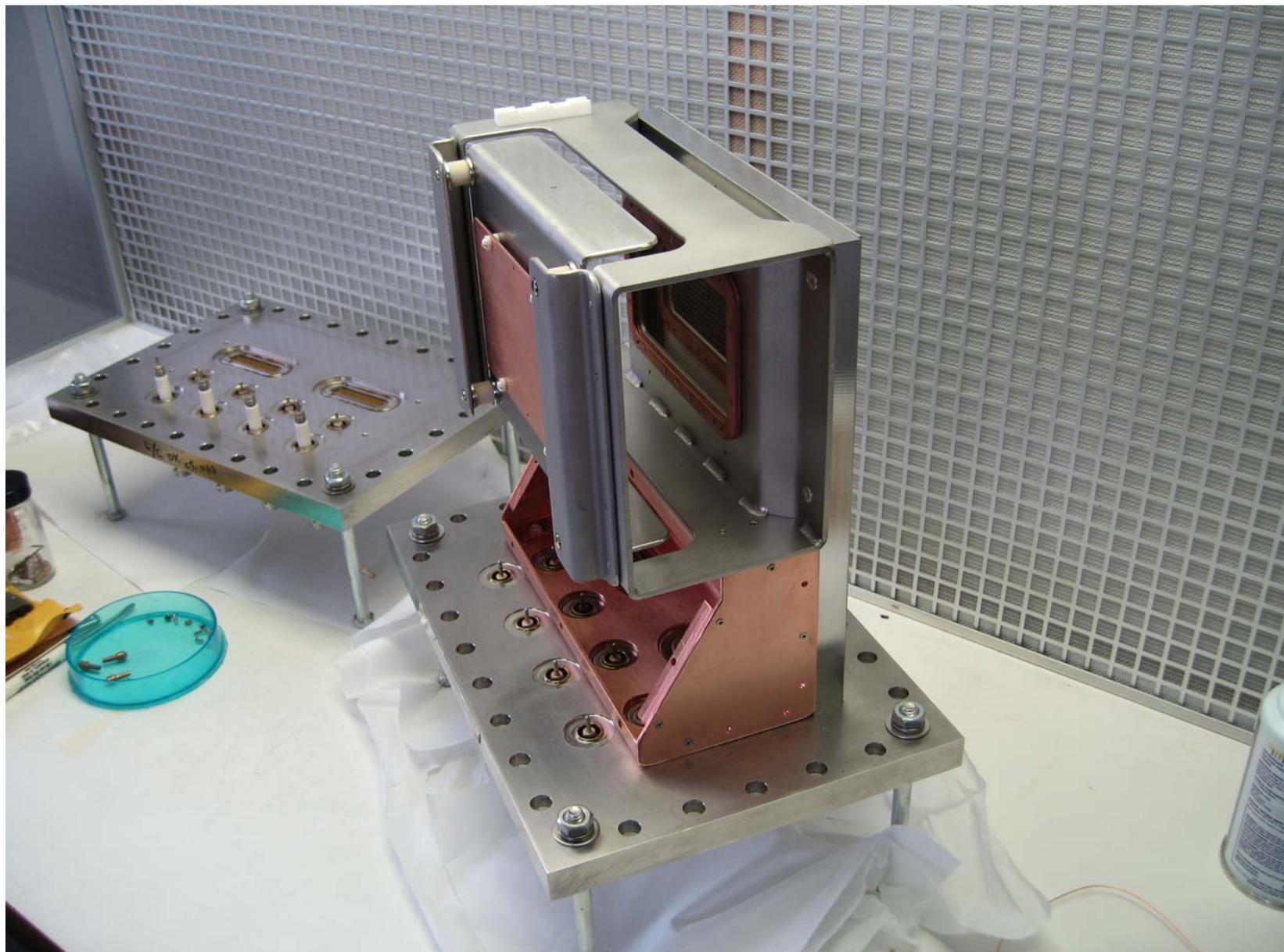
IPM upgrade – original design



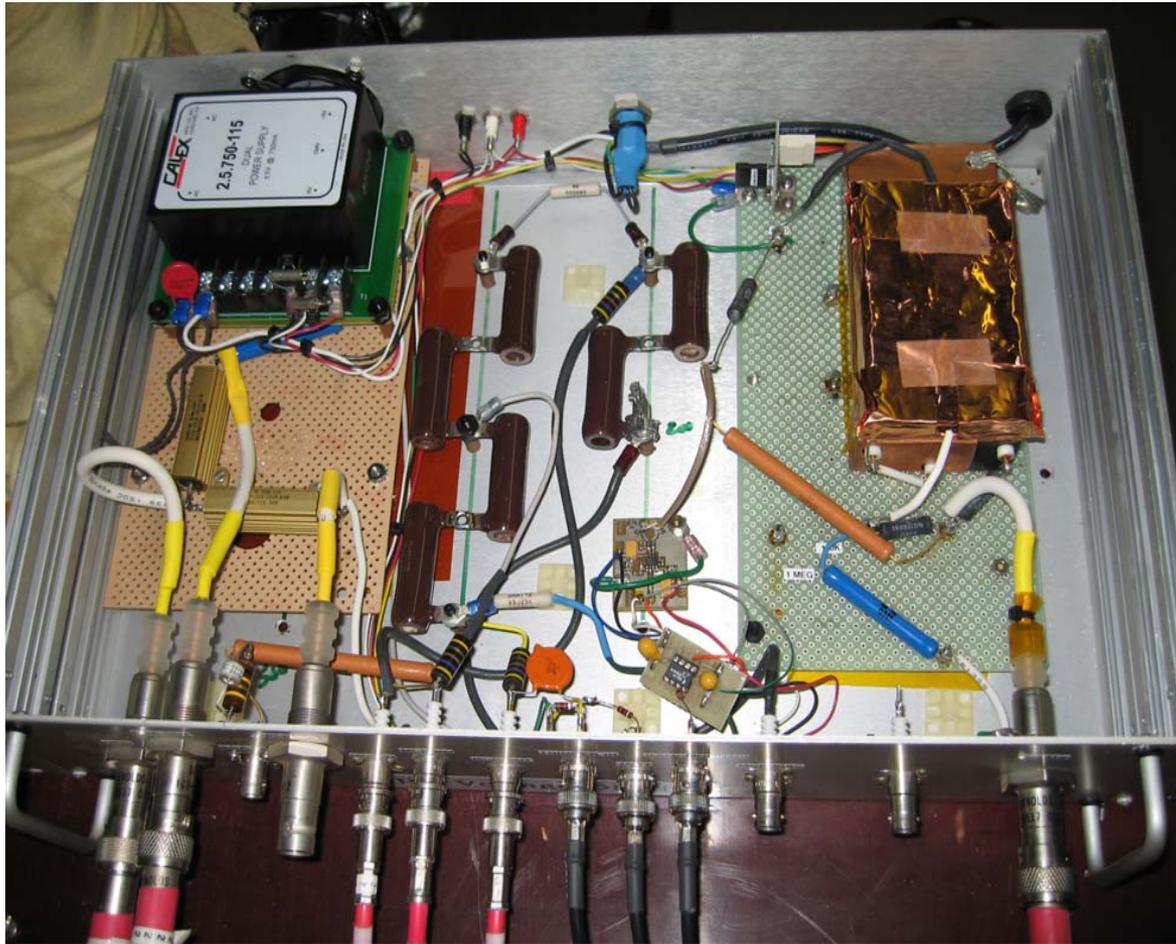
IPM vacuum upgrade yellow vertical - first prototype



IPM upgrade



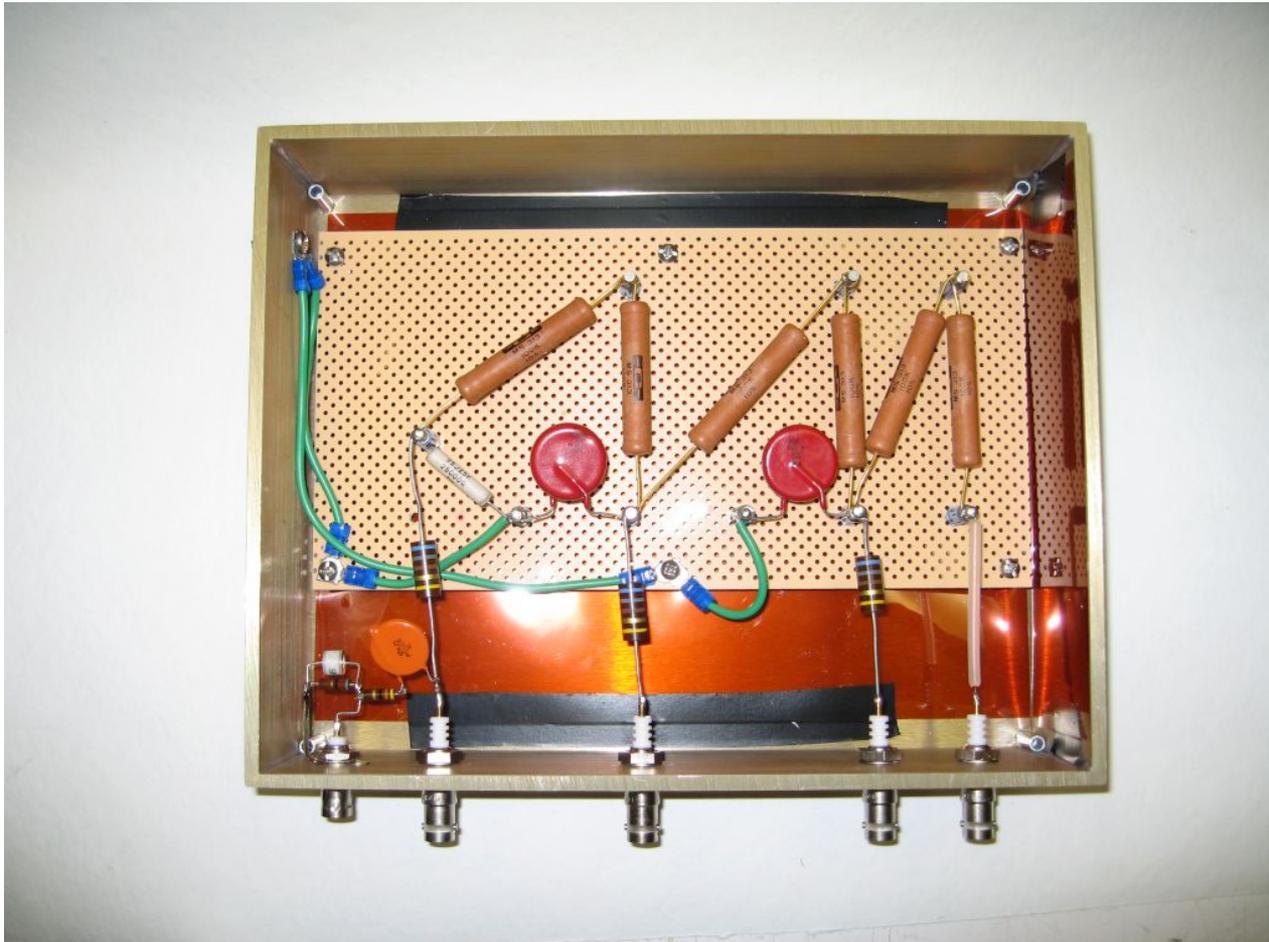
RHIC IPM – old box design



RHIC IPM – new design compartmentalized



RHIC IPM- new divider with filters



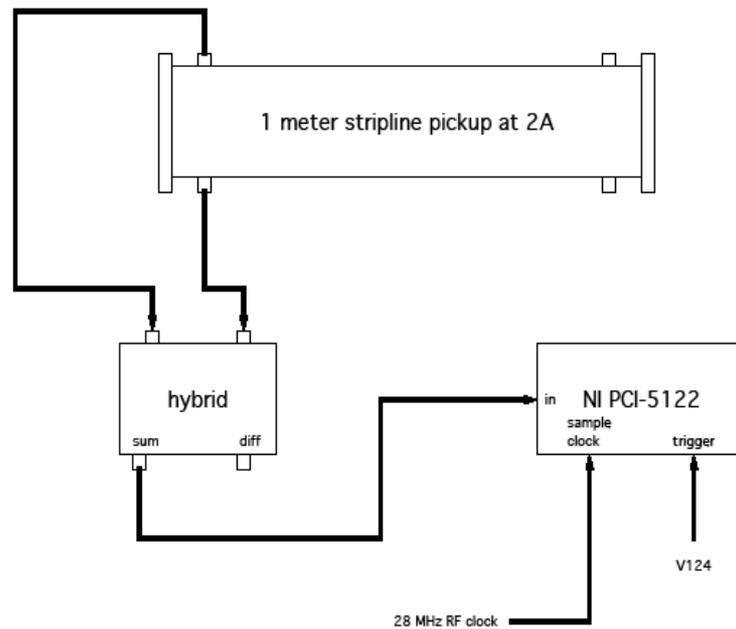
BBBTBT Monitor

- The bbbtbt monitor was tested the last day of the run with beam...this may work out as an instability monitor. A work in progress – still needs decimation in hardware and software. Digitization performed by a 2 channel 100 Mhz NI board – Degen/Dawson
- Developing this instrument may prove to be very useful ...electron cloud studies etc
- Maybe used parasitically to develop a bunch by bunch tune measurement.

- Gated BBQ development... will try to do this without disturbing the existing system.
- We presently “excite” all bunches and “listen” to all the bunches...
- We can try to – parasitically – develop a system that “listens” to one bunch...
- Use either the BBBTBT monitor or a special AFE....
- We have ideas.. But we need to make a plan....

RHIC Instrumentation

bbtbt monitor block diagram



RHIC Instrumentation bbbtbt monitor

