

RF pickup ↔ Remedies(?)

polar. mtg.
20.06.12

- Run12 ends next week: time to start planning shutdown work
- One major problem to address: RF pickup
(other major problem target lifetime; not today...)
- Several remedies attempted thru Run12, varying success
- Here try systematic catalogue of attempts, results
Just what I have recorded or remember; what else?
- Checks of effectiveness:
 - #channels excluded offline (Dima's algorithm)
 - scope studies during beam operation (Anatoli et al.)
 - scope studies with applied RF (Anatoli et al.)

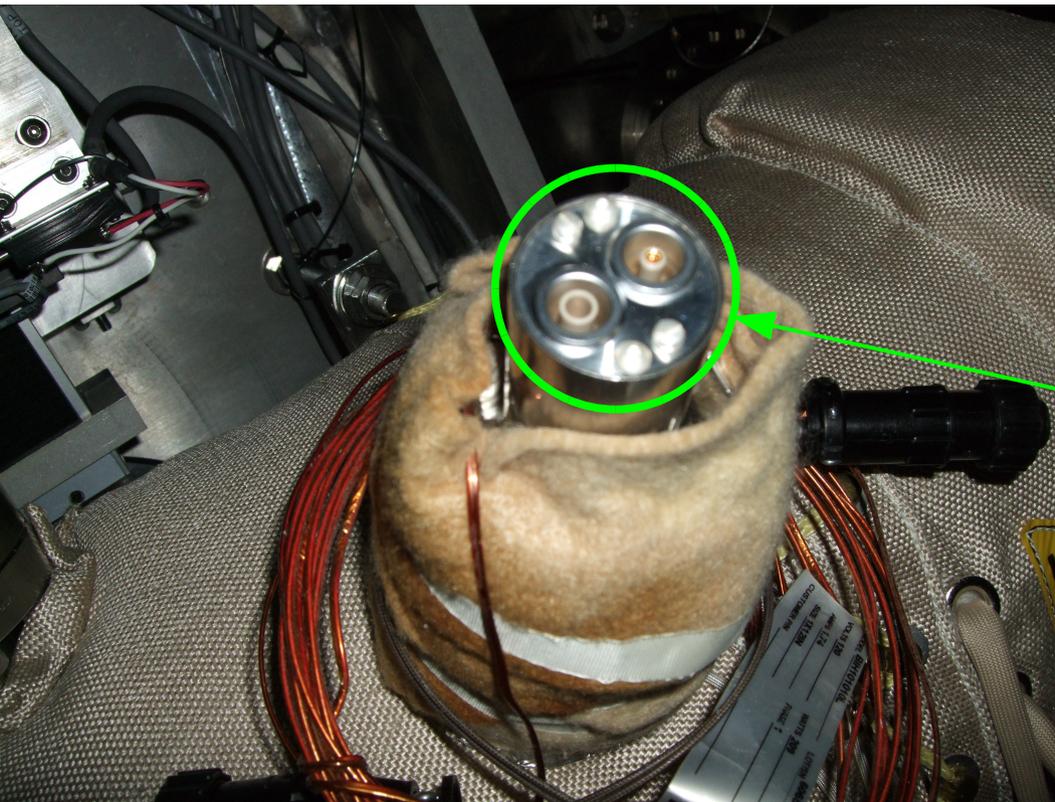
Attempted remedies

- Stochastic cooling pickup:
 - twisted-pair cable, terminated
- Preamp boxes:
 - Al foil wrapping (2 attempts)
- Detectors environment:
 - RF screens, screen↔detector spacing
- MUX:
 - bypassed channel test, housing grounded
- Odds & ends:
 - flange feedthroughs 'terminated'
 - port windows shielded
 - pulser attenuators rack→preamps

Stochastic cooling pickup: remedies

(maint. day 14.03.12)

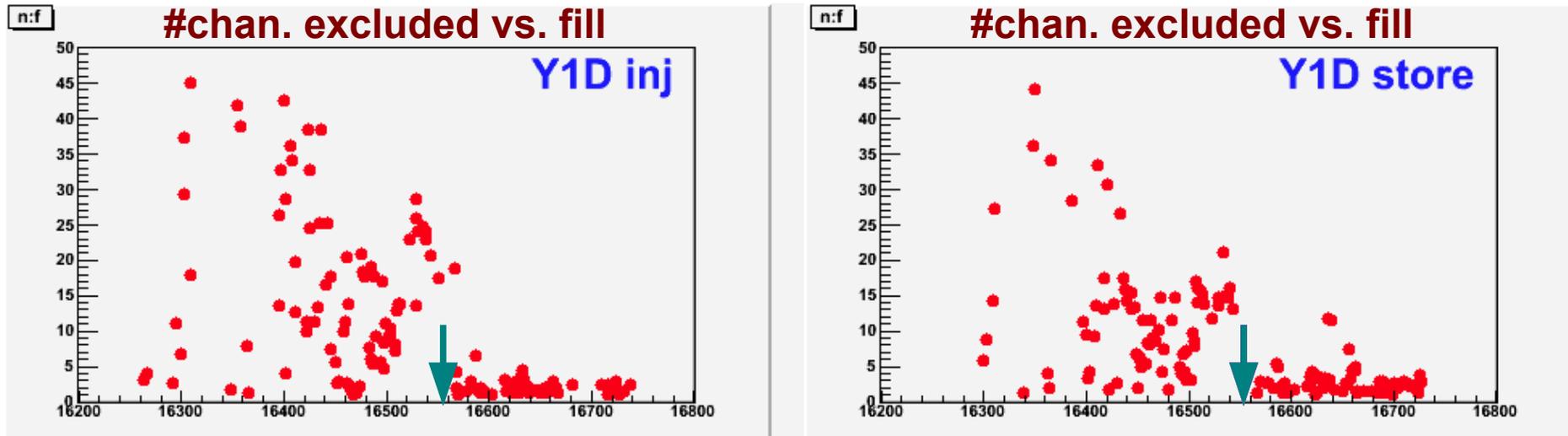
- Stochastic cooling pickup signal cable (twisted pair) removed and feedthrough terminated (M. Brennan)



- Stochastic cooling vacuum gauge feedthrough was floating, now grounded (M. Brennan)

Stochastic cooling pickup: results

- Sharp drop in #chan. excluded offline (Y1D next to pickup):



- Anatoli: scope checks with beam, twisted pair on/off?

SEEMS THIS WAS THE MAJOR SOURCE OF OUR PROBLEMS

Suggestions for shutdown / start Run13:

- Close coordination with RF group on possible RF sources, remedies
- Antenna to monitor external RF?
- On our side external shielding & grounding

Preamp boxes

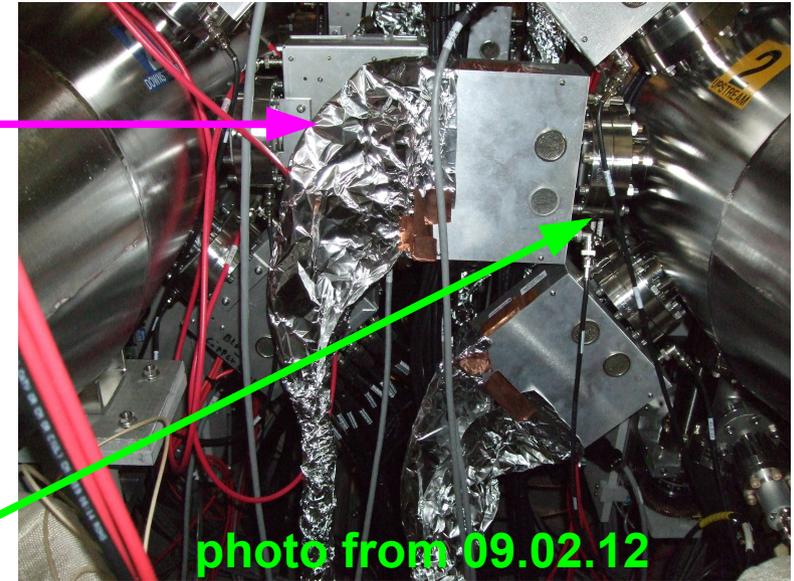
- On 09.02.12 back side of boxes (away from chamber) wrapped with Al foil
- No apparent help (still huge RF from stoch. pickup cable...)

- On 04.04.12 front side of boxes (near chamber) wrapped with Al foil

- With applied RF clear reduction of RF seen on scope especially near connector hole, flange
- Confirmed in Bldg. 930 bench setup?

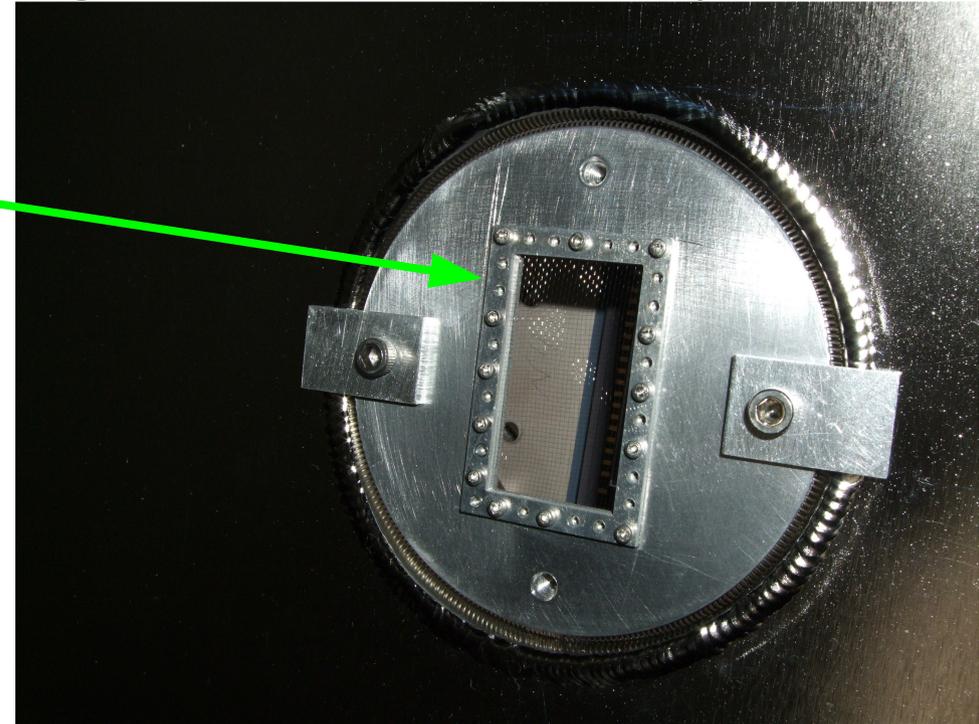
Suggestions for shutdown:

- Complete redesign of box (not electronics) (CAD electronics group?)
- Attention to shielding & grounding, connector holes, ...
- Ventilation?



Detector environment

- On 14.03.12 Y2U detectors 1,6,3,4 moved farther from port aperture (det. 1,6 spacer flanges; det. 3,4 long→short pin detectors)
- Results? (#chan. excluded inconclusive)
- On 11.04.12 new tungsten RF screens B1-4, B2-3, B2-4, Y2-4
- RF shields on B2-1 & B2-6 were misaligned, repositioned
- Results? (#chan. excluded inconclusive)
- Studies with applied RF in Bldg. 930 bench setup give good comparisons of relative merits different screens
- Results?

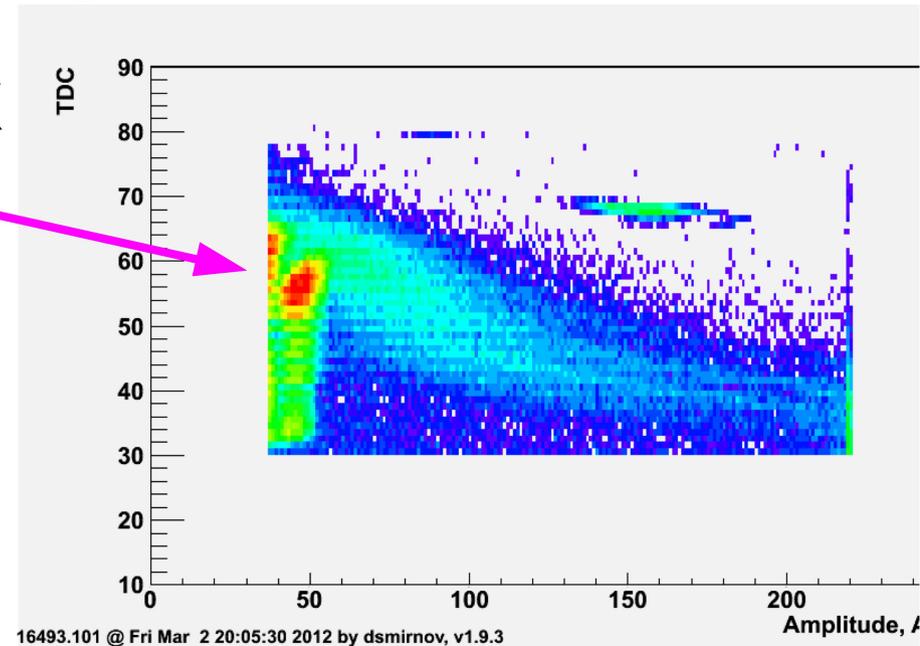


Suggestions for shutdown:

- Apply best knowledge from bench tests; new screens
- Carbon acceptance thru screens?
- Spacer flanges? (BNL 1mm short pins already?)

MUX

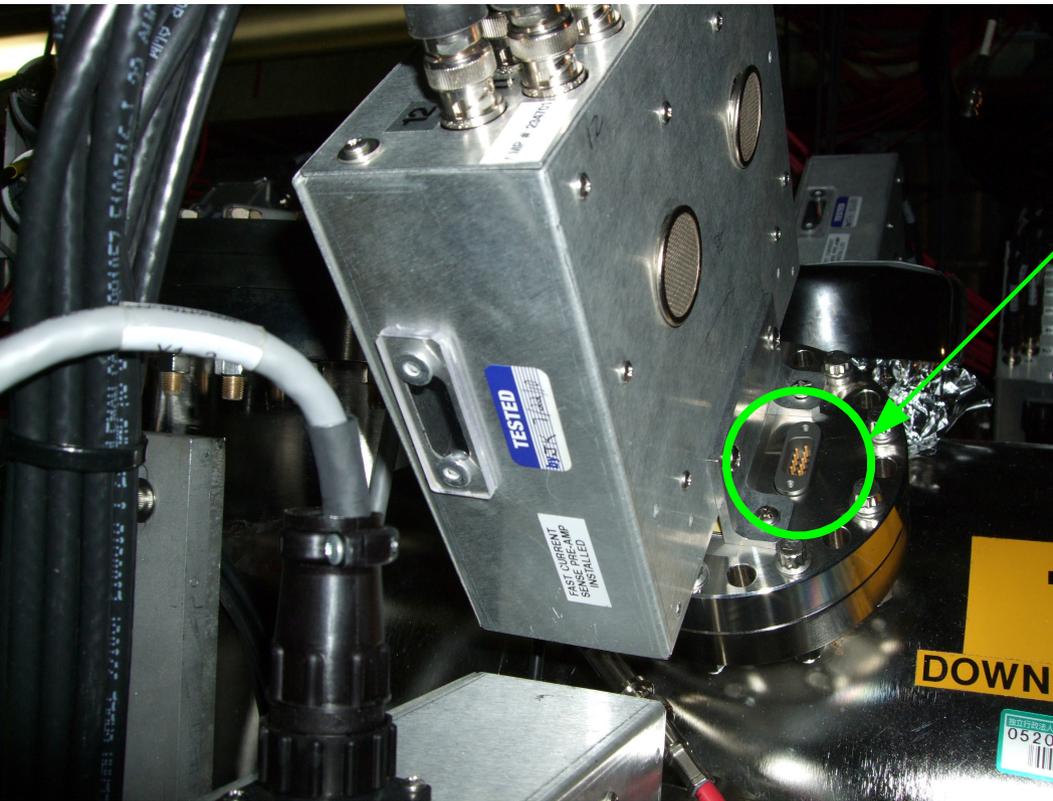
- MUX circuit diagram show “off” chan. are open circuit
- On 29.02.12 Y1D ch. 25 bypassed MUX
- Result: RF noise still in data
- Chan. replaced in MUX on 14.03.12
- MUX housing found not grounded;
grounded to polarim. frame 14.03.12



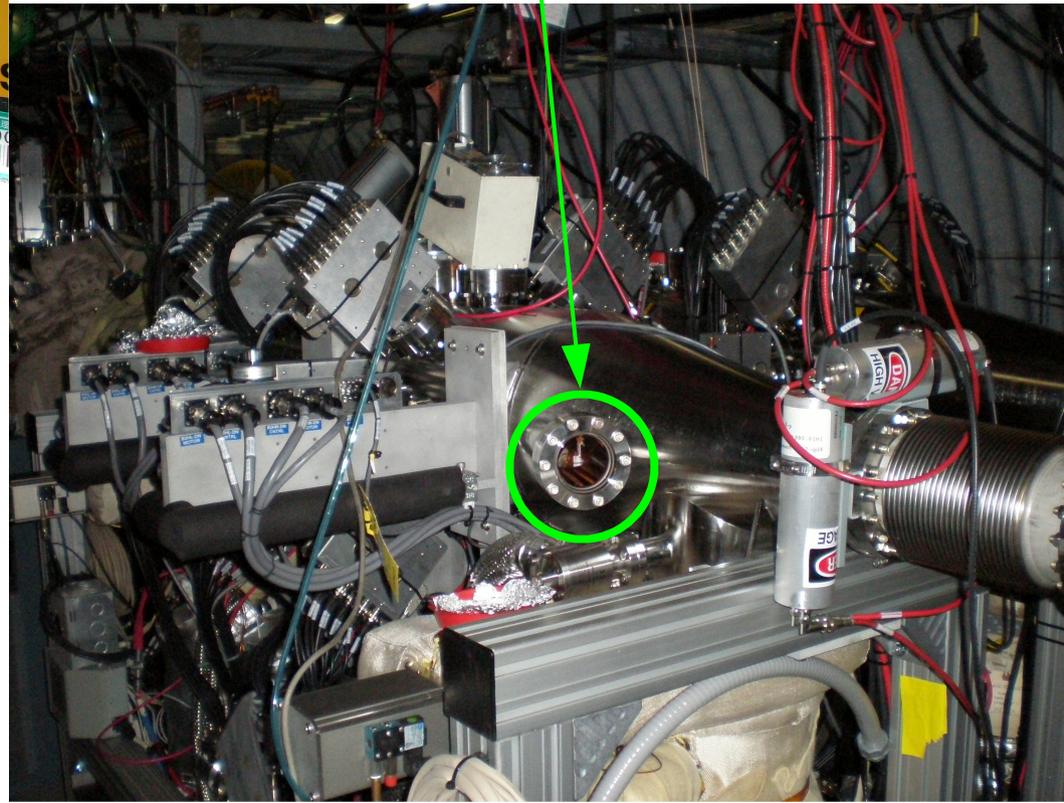
Ambitious suggestion for shutdown:

- MUX may or may not be source of RF pickup
- Also, MUX electricians broke down twice, requiring tunnel access
- Move MUX tunnel→near counting room solves both problems
- Requires ~150 signal cables from tunnel→near counting room
- \$\$\$, manpower?
- Or: change circuit so “off” chan. are *not* open circuit

Odds & ends



- 24 unused feedthroughs on detector flanges grounded
- 8 viewing port windows shielded with Al foil



- Pulser attenuators moved pulser rack → preamps
- Results unknown, can only help
- Already done for ~zero \$, effort
- Perhaps can improve a bit...

Summary

- That's my recollection of attempted remedies & results
What did I omit?

Possible actions:

- Watch to be sure CAD RF plug their holes, terminate their feedthroughs, remove extraneous signal cables, ...
- Preamp box grounding & shielding (CAD electronics group?)
- New RF screens based on test bench studies
- MUX: move it? or clean up circuit?