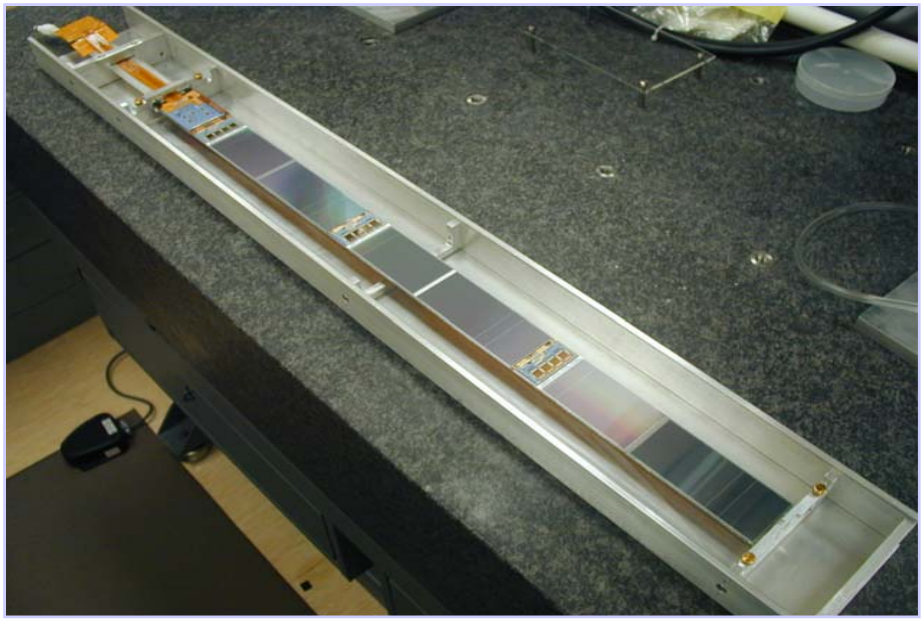
Silicon Closeout Goals

- Build 15 staves between now and Feb. 03.
- Assemble L0 modules (~5) on CF structure
- Assemble Staves and L0 into “barrel” and test through April 03
- Write NIM article(s) on Run IIb Silicon design and prototype results
- Finish End of April 2004



- Remaining Closeout Total Cost
- WBS schedule
  - ➔ M&S
  - ~ 100k$ left to spend (inc. OH)
  - ➔ Labor ~ 296k$ + 90k$ OH

Recent Sucesses

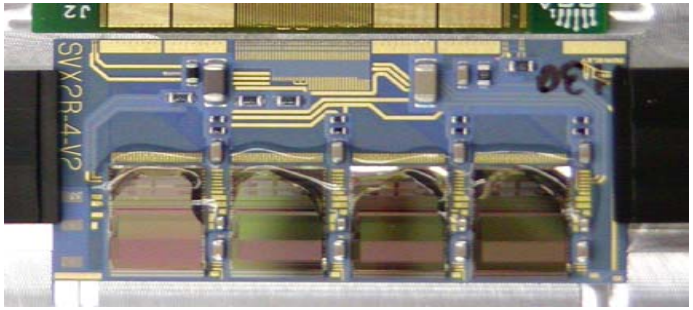
- 7 presentations at IEEE/NSS Oct. 03 Portland, OR
  - → Stave Design and testing
  - → Deadtimeless operation of the staves
  - → L0 design and testing results
  - → Comparison of BeO and Polyimide MPCs
  - → Performance of the RunIIb Silicon sensors
  - → Run IIb Silicon DAQ upgrades and development of simple test system
  - → SVX4 chip
- We are currently in the process of writing up these for publications in IEEE transcations.

Hybrid Assembly

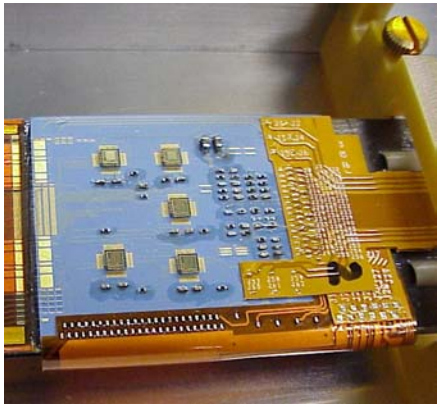
- Hybrid "preproduction" at LBL and Davis
  - Oversite of assembly and testing expertise provided by LBL, INFN, Helsinki, all at LBL
  - hybrids "stuffed" at two different assembly houses and wirebonded at a separate factory (promex)
  - Tested and encapsulated at LBL
  - Shipped to Davis for Burnin
  - Burnin at Davis – results evaluated, entered in database
  - Ship good ones to FNAL, bad ones back to LBL

Part Counts

- 90 hybrids assembled between mid Sept and mid Oct
- 61 hybrids passed burn-in at UCDavis
  - ➔16 more have been burned in
  - ➔Expect to ship to FNAL this week



- BeO Mini- PC received last month
  - ➔4 assembled so far
  - ➔They work well
    - production problems with prototypes solved by vendor
    - 0.25 micron transceiver chips work as planned!
  - ➔2 have been glued to stave cores

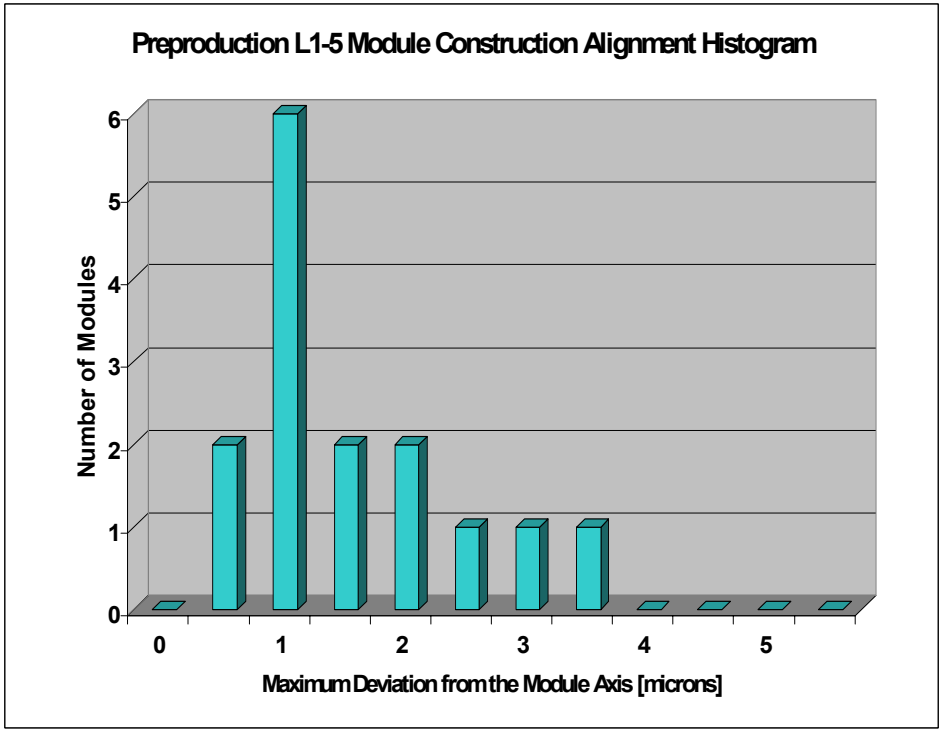


Modules and Staves

- **15 Modules Oct. 8-27**
  - **new hybrids**
  - **new SVX4 chips**
  - **production sensors**
  - **pitch adapters**
  - **fixturing**

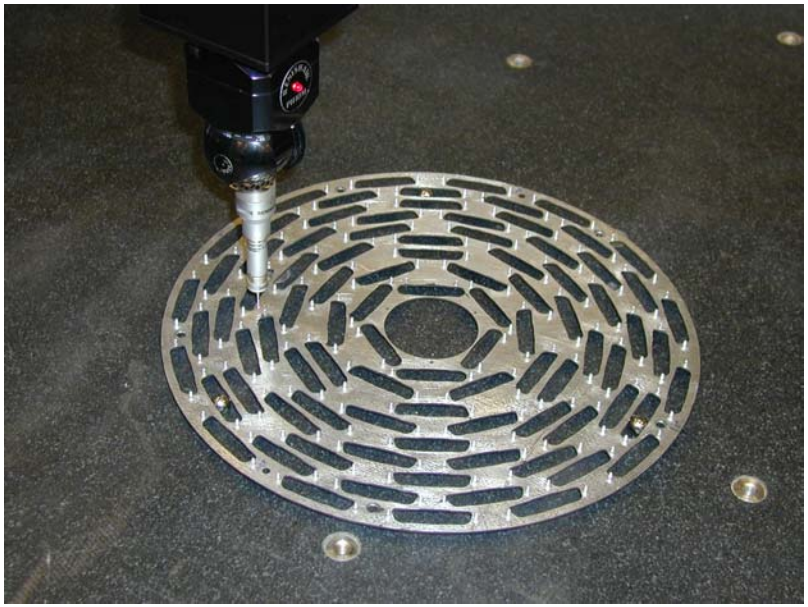
- **1st half stave completed Oct. 31**

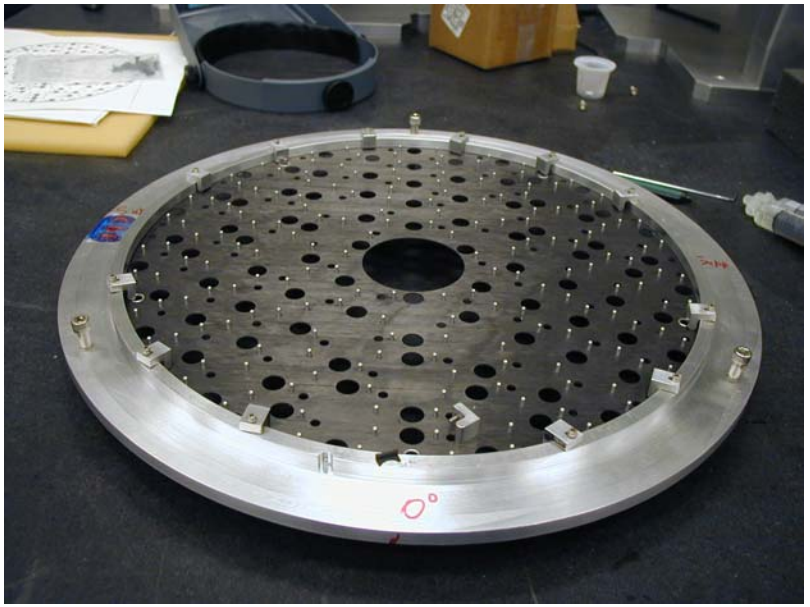
- **2nd stave to be started this week**



Module –Module misalignment Average = 1.5 microns!

Bulkheads





Outer Bulkhead

- staves installed through slots
- pins provide precise alignment

Inner bulkhead (z=0)

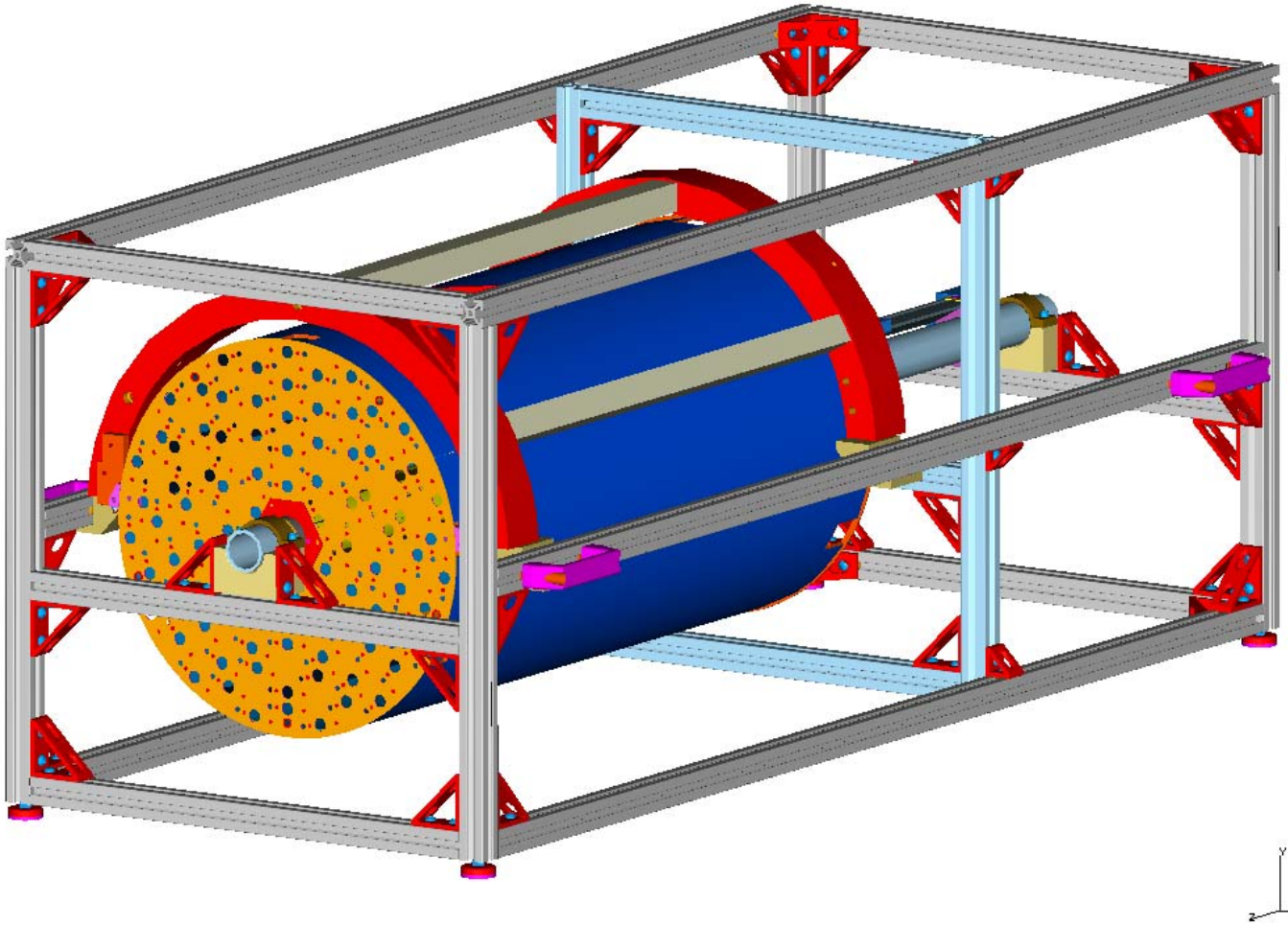
- installation arm passes through holes
- pins provide precise alignment

Bulkhead Assembly

Precision of pin locations is built into assembly plates

1/3 of pins are glued at a time

Barrel Test and Display Box



- Supports outer barrel from mounts on bulkheads
- Supports L0 and hybrids on a separate pipe
- cooling and cables will be dressed to cross bars
- Walls will be dark for testing
- can be replaced by plexiglass for display purposes

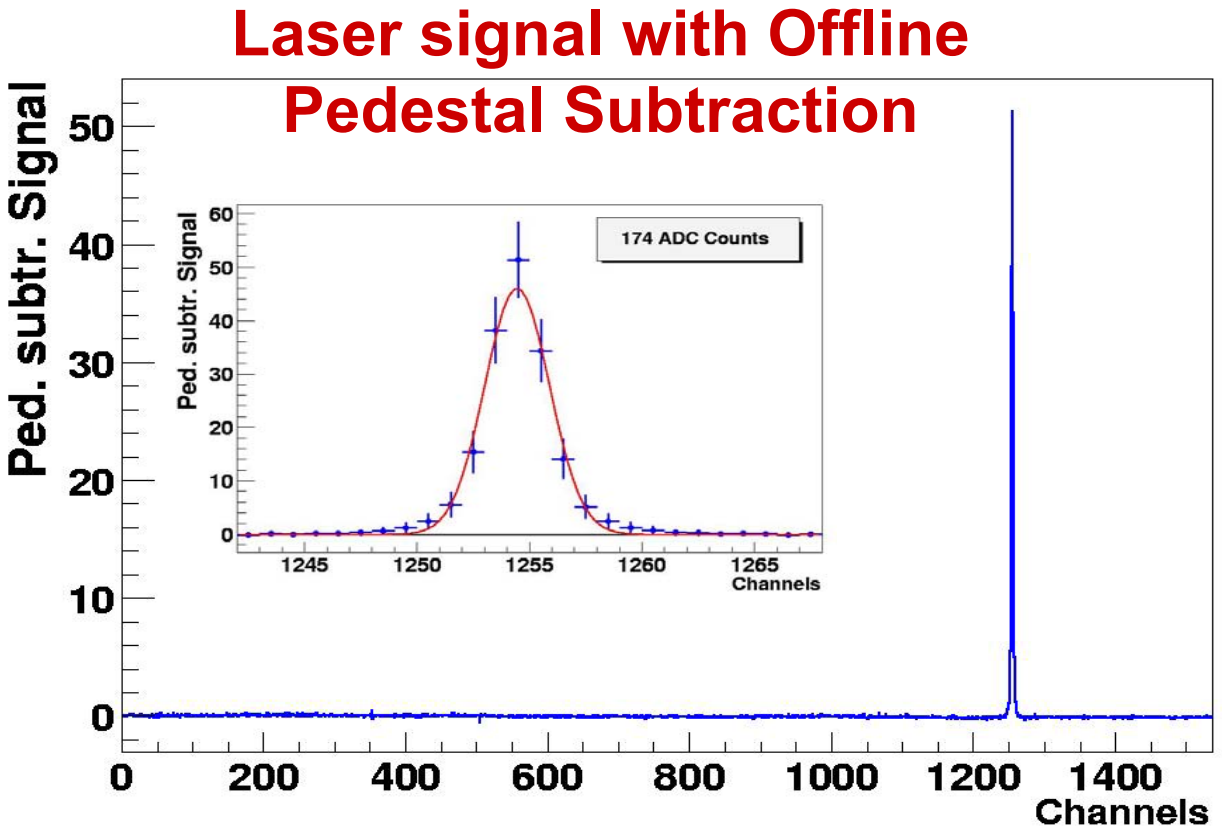
Bulkhead Status

- Pin gluing fixture used to install all pins in both inner and outer bulkheads
- Measurements of pin locations finished last week
- Analysis of data in progress

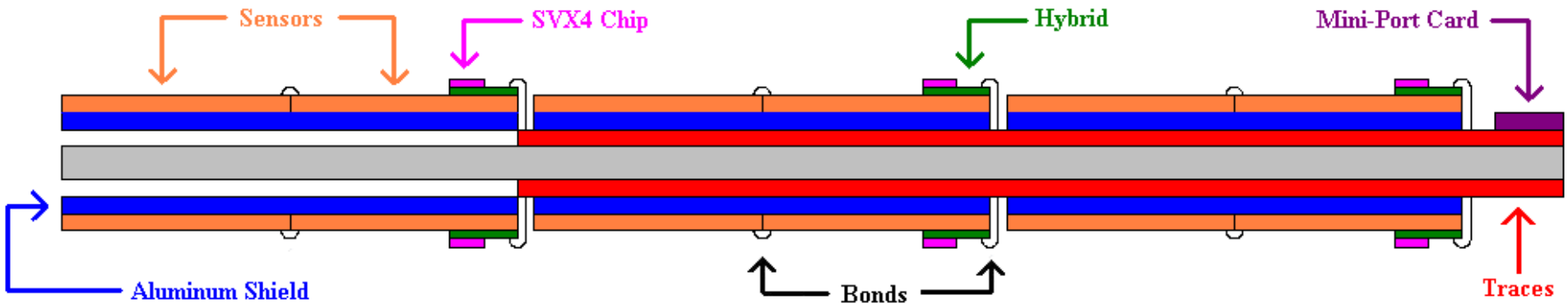
- These bulkheads will be used to build a barrel
- Design of testing/display box completed – now in drafting

Test with prototype staves

- Shine laser light on stave
- See clear and clean signal after pedestal subtraction



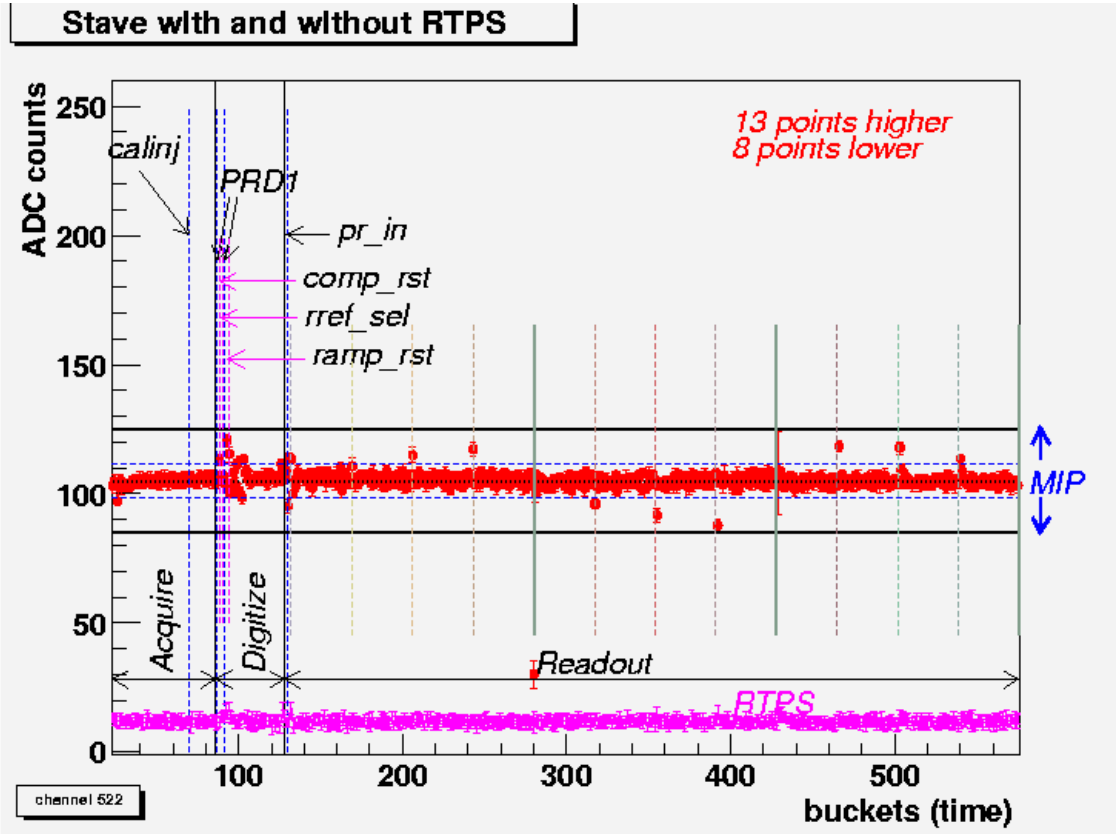
Unique aspect of Stave: Compact Design



- Hybrids glued to sensors
- **Sensors in proximity of bus cable**: crucial feature, very attractive mechanically, but challenging for electrical performance
- 3 separated aluminum shield sections
- bus cable traces stop after reaching 3rd hybrid
- Can study and compare noise in 1st two modules to 3rd module
- Can study different shield and ground configurations

Tests with prototype staves: Best so far

- Pedestal level and noise for an arbitrary channel over all modes of chip operation
- pedestal shifts are largely suppressed remaining effects are typically less than the equivalent of a Minimum Ionizing Particle (MIP)
- shifts are completely gone when using real-time pedestal subtraction (RTPS), which removes "average" pedestal event-by-event



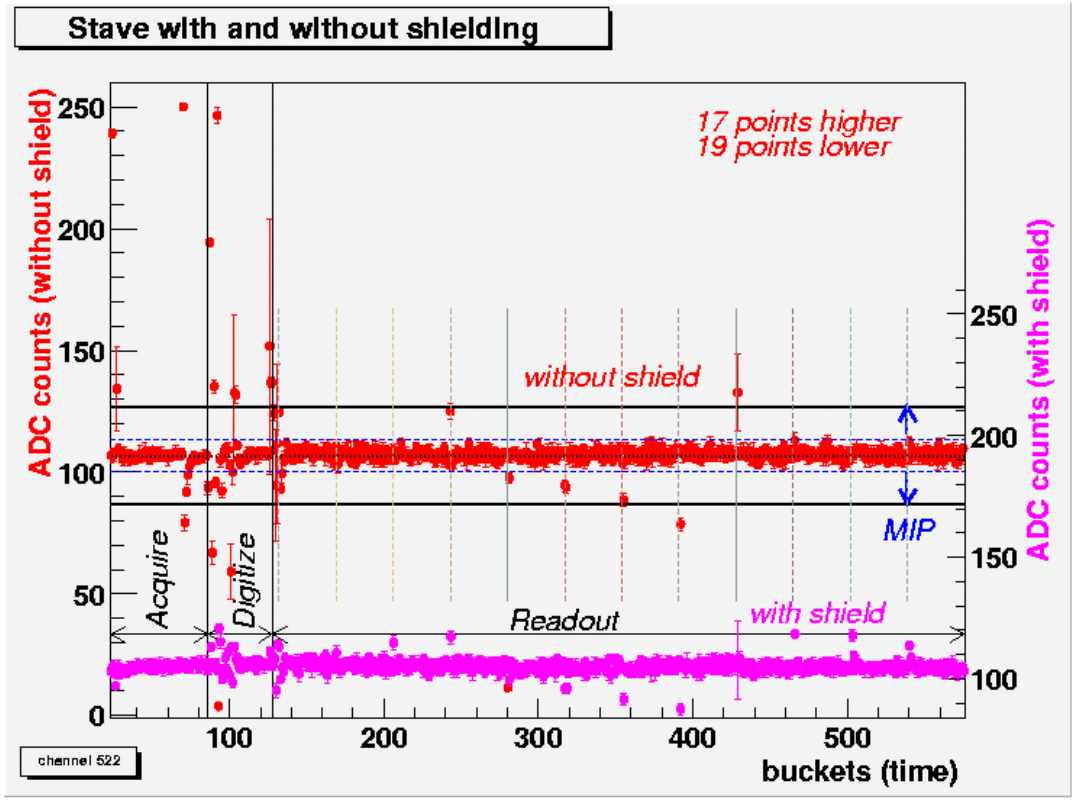
Stave Shield Studies

Without shield (red, left axis):
huge pickup effects due to control signal single-ended lines: fast rise times couple effectively to back plane.

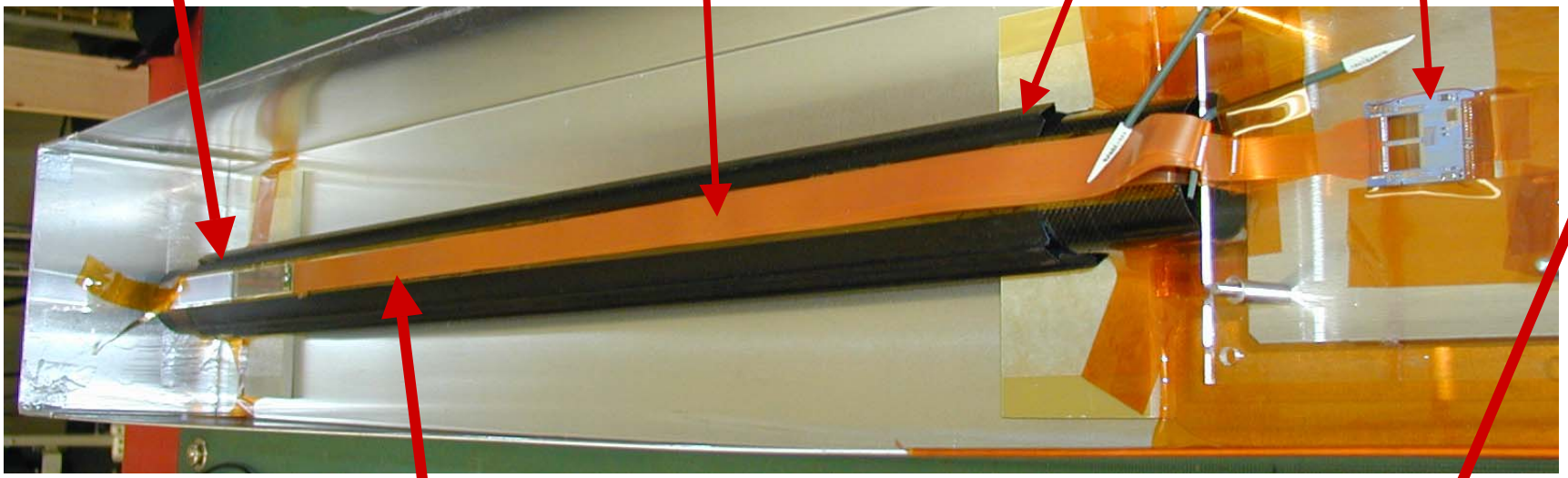
This pickup only occurs on channels directly over the control lines of the bus cable

With shield (purple, right axis):
coupling to sensor strongly suppressed

Other tools to reduce pickup:
- select slow preamp rise time
- optimize control patterns:
  e.g. raise signals outside of preamp integration time

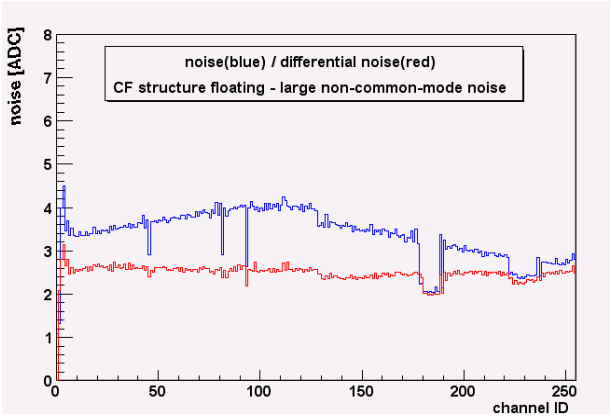


L0 Modules and Hybrid on CF



Module 2 sensors and Keycom cables underneath Module 1 cables. Module 2 hybrid is off screen

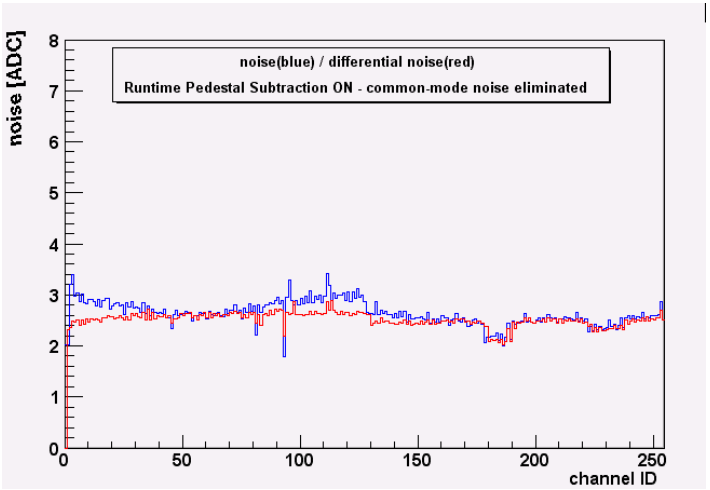
Tests with L0 prototype



- **Floating CF picks up noise**
- **Induces noise in Silicon**
- **Regions with only the cable or only one sensor bonded have less pickup**

Once the CF is grounded the pickup is much less

More studies will proceed with new modules and CF structure



Schedule/Plans

- November:
  - Finish testing of assembled modules
  - Build a full stave (both sides)
  - Study noise and pickup with various grounding and shield configurations
- Dec.- Jan.:
  - Build more staves (~10)
  - Build 5 L0 modules
  - Build barrel and setup for stave installation
- Jan.-Feb:
  - Install completed staves and test in barrel
  - Install L0 modules on CF structure and test
- March-May
  - Test barrel and L0 separately
  - Install L0 in barrel and test together
  - Write papers

Remaining M&S Costs

Documentation, SVX4 close-out	$21,130.00
Bus Cable Manufacturing	$6,000.00
Data-JPC Fabrication	$1,000.00
Power-JPC Fabrication	$4,000.00
Setup new DAQ stands at FNAL	$4,000.00
Barrel test box	$7,500.00
Miscellaneous fixtures and modifications	$10,000.00
Post processing (9 wafers)	$4,000.00
Probe Station Maintainance	$2,500.00
L0 protoype system test	$2,000.00
Preparing 2nd CF Support Structure	$2,000.00
L0 detector system test (5 modules)	$4,000.00
Combined Outer/L0 System Test	$5,000.00
Stave stability test	$2,000.00

Total ~ 100k$ (75k$ + overhead)