



Run2B Closeout

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Outline

- **Scope of Closeout**
 - ◆ Finalize and document R&D activities
 - ◆ Closeout for L0 is very relevant to new L0 design
- **L2-5 Modules & Staves**
 - ◆ Sensors/Hybrids/Modules/Staves
- **L0 Modules & CF support structure**
 - ◆ CF support structure
 - ◆ Electrical tests of L0 modules
- **Summary**



Layer 2-5 closeout

- L2-5 Stave was a building block for outer layers of Run2B detector
- Stave components include
 - ◆ Sensors
 - ◆ Two types of 10-chip hybrids
 - ▲ axial
 - ▲ stereo
 - ◆ Four types of modules
 - ▲ axial 10-10, axial 20-20
 - ▲ stereo 10-10, stereo 20-20



L2-5 Sensor Closeout

- Originally ordered 2735 L2-5 sensors from Hamamatsu
- Received 792 production sensors
 - ▲ Already had 100 prototype sensors
 - ◆ All received batches were partly tested
 - ◆ ~ 40 used for L2-5 module/stave assembly
 - ◆ ~ 40 used for long term studies
- Order closed, closeout for sensors complete



L2-5 Hybrid closeout

- Received new L2-5 hybrids from 3 vendors
 - ◆ Amitron and CPT were within specs, Halcyon failed to meet the flatness spec by far
- Orders are closed, closeout for L2-5 hybrids complete

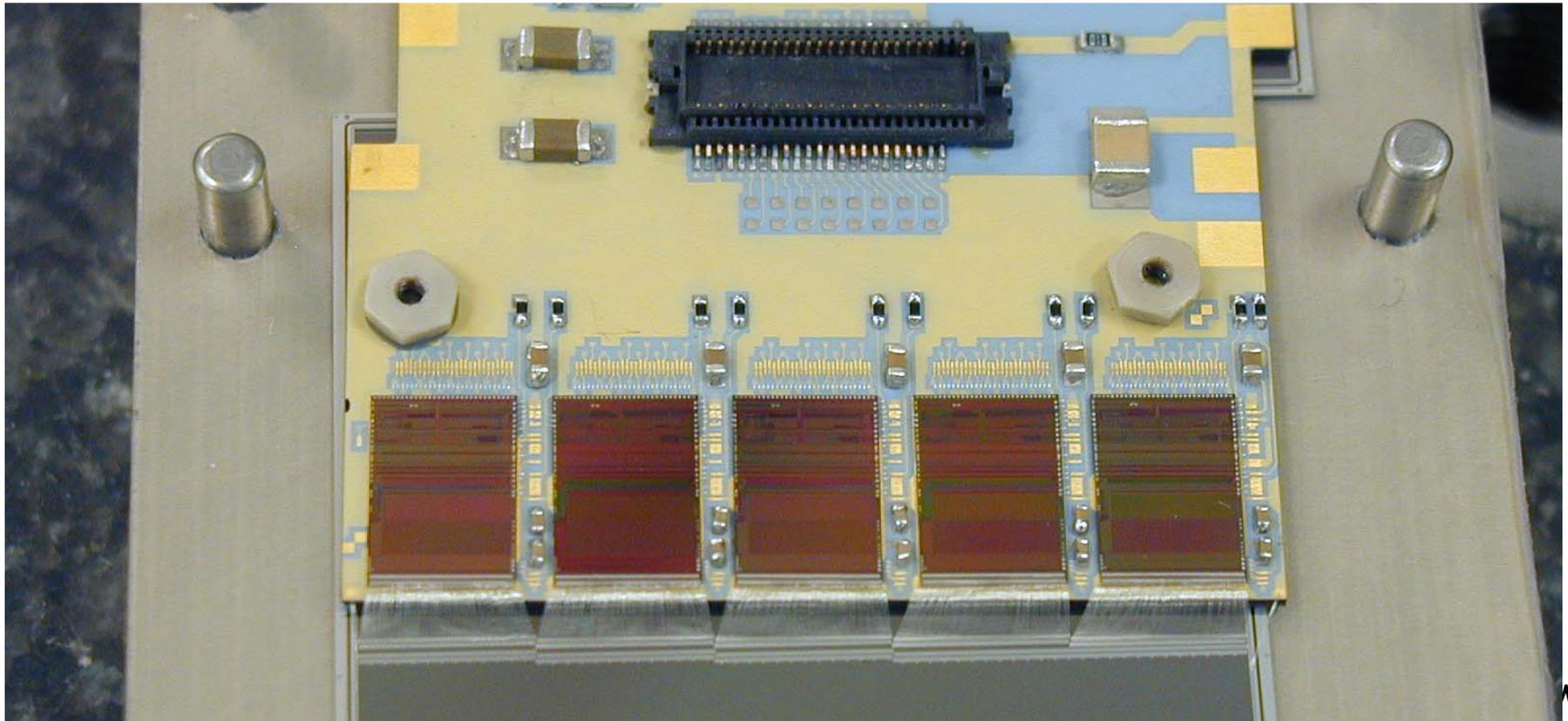
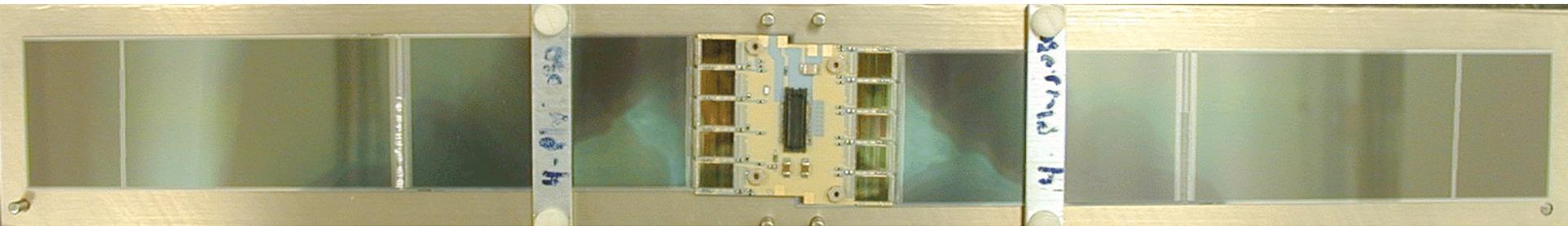


L2-5 Module/Stave Closeout

- Assembled 12 L2-5 modules
- Assembled one electrical grade stave
- Stave tested both in the standalone mode and with full chain readout



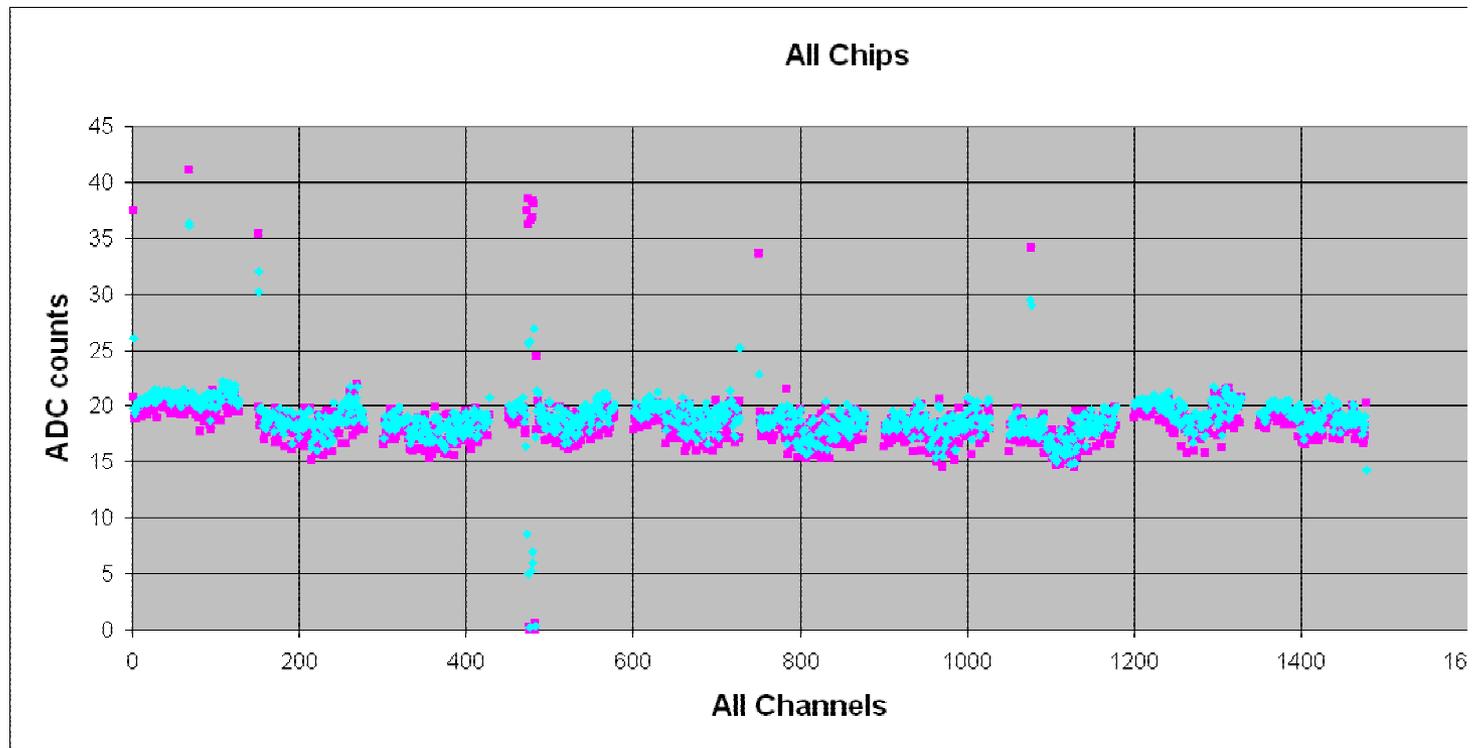
L2 Stereo 20-20 Module





L2-5 module performance

- L2S 10-10 module
 - ◆ sensors fully depleted @ 80 V bias



Differential noise [ADC counts x 10]
Total noise [ADC counts x 10]



Electrical stove

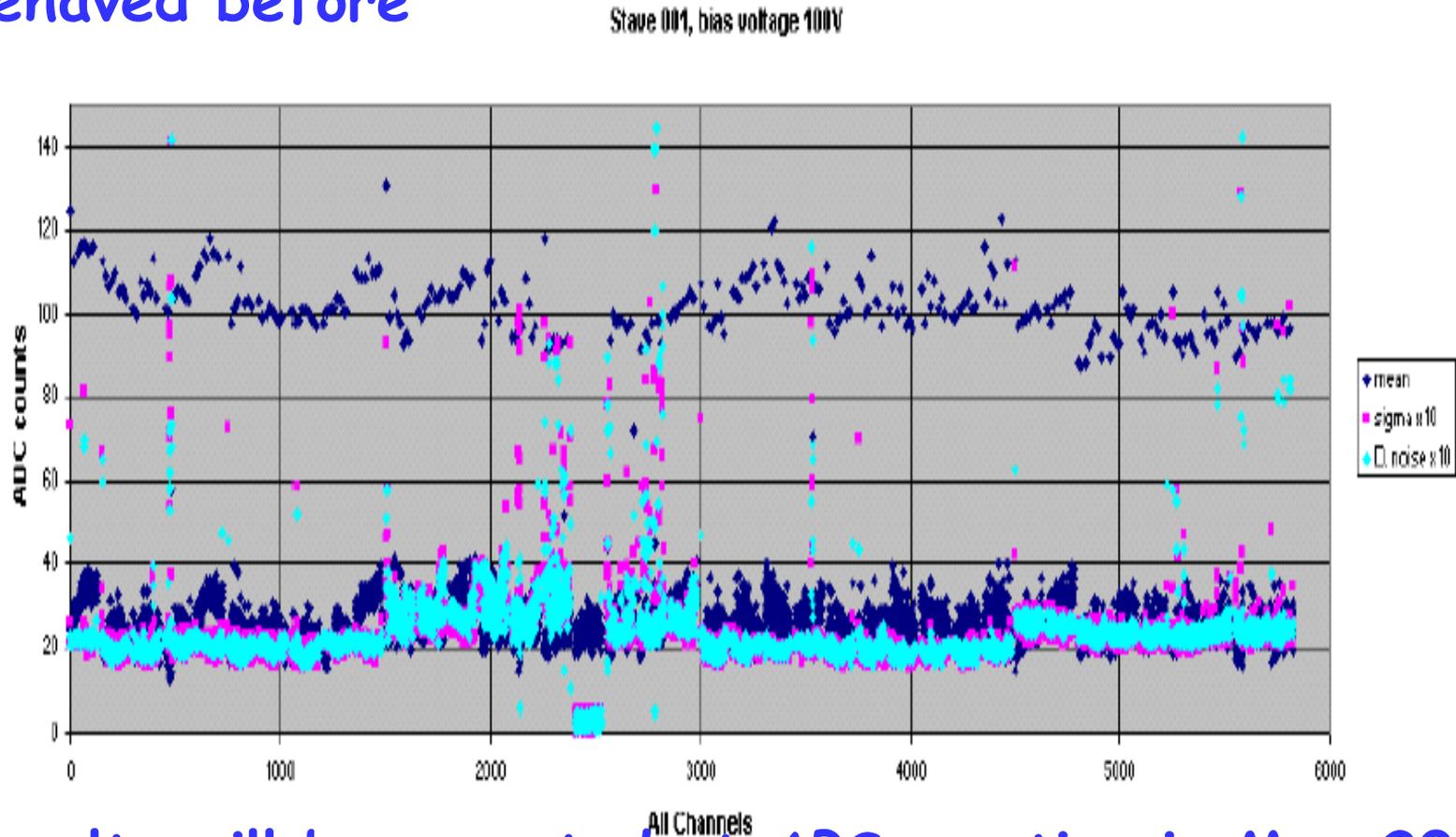
- Has 4 working modules
- Dry gas enclosure





Tests of Electrical stave

- No surprises - all modules behave in the stave as they behaved before



- Results will be reported at APS meeting in May 2004
- May want to assemble new stave with new SVX4 chips



L0 closeout

- New Layer 0 will have very different design
- However the original Run2B Layer 0 allowed to prototype many aspects of the new design
 - ◆ CF support structure
 - ◆ Grounding/noise issues
 - ◆ Assembly issues
- Received the new support structure in December 2003
- By now mounted on the structure and tested four L0 modules
- Plan to report results at APS meeting in May 2004
- This work naturally became Layer 0 project activity



LO support structure

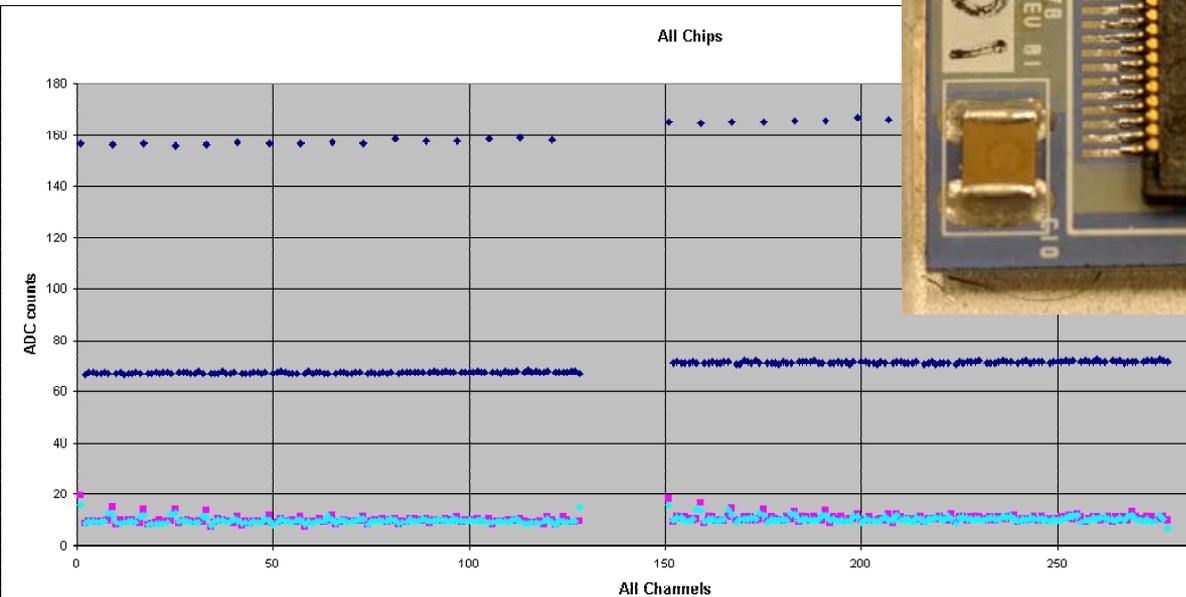
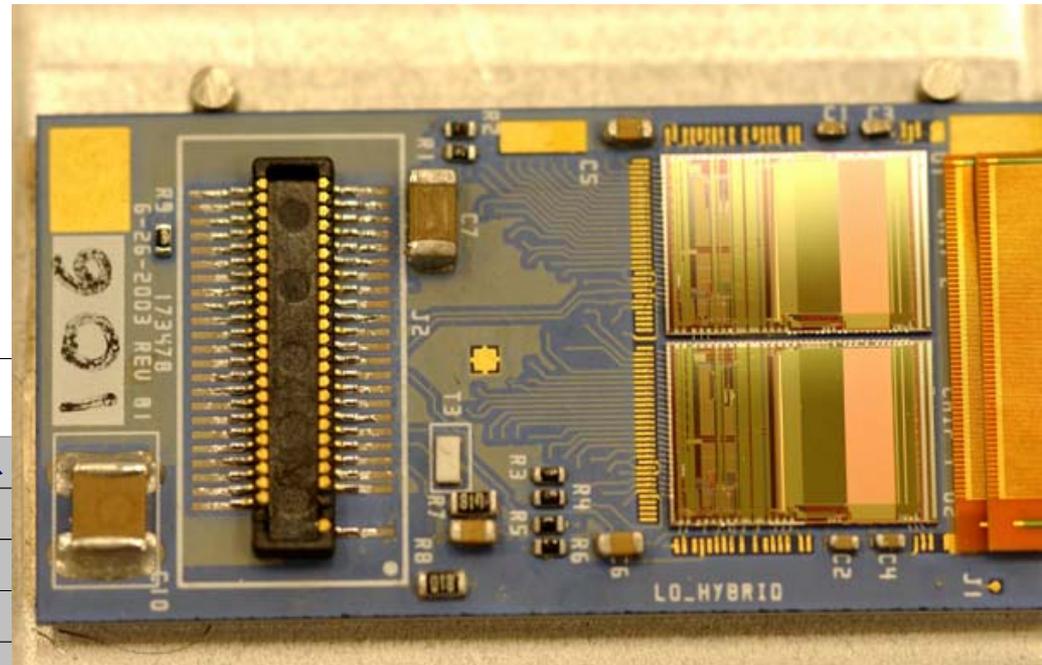
- Prepared by University of Washington
- Implements new grounding approach : laminated ground mesh covering all surface - crucial design feature ensuring low inductance path for GND and hence low noise





New LO hybrids

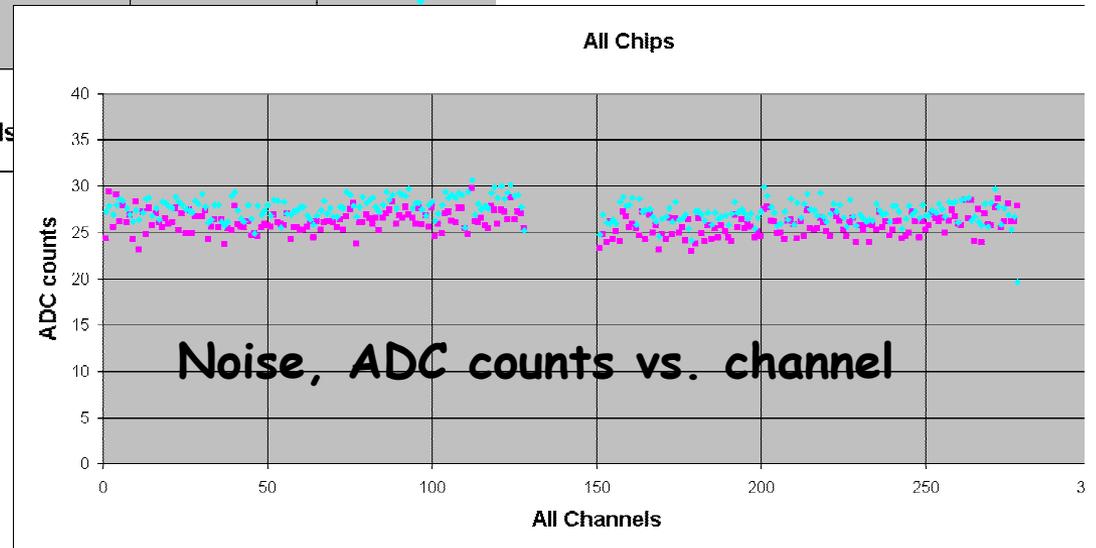
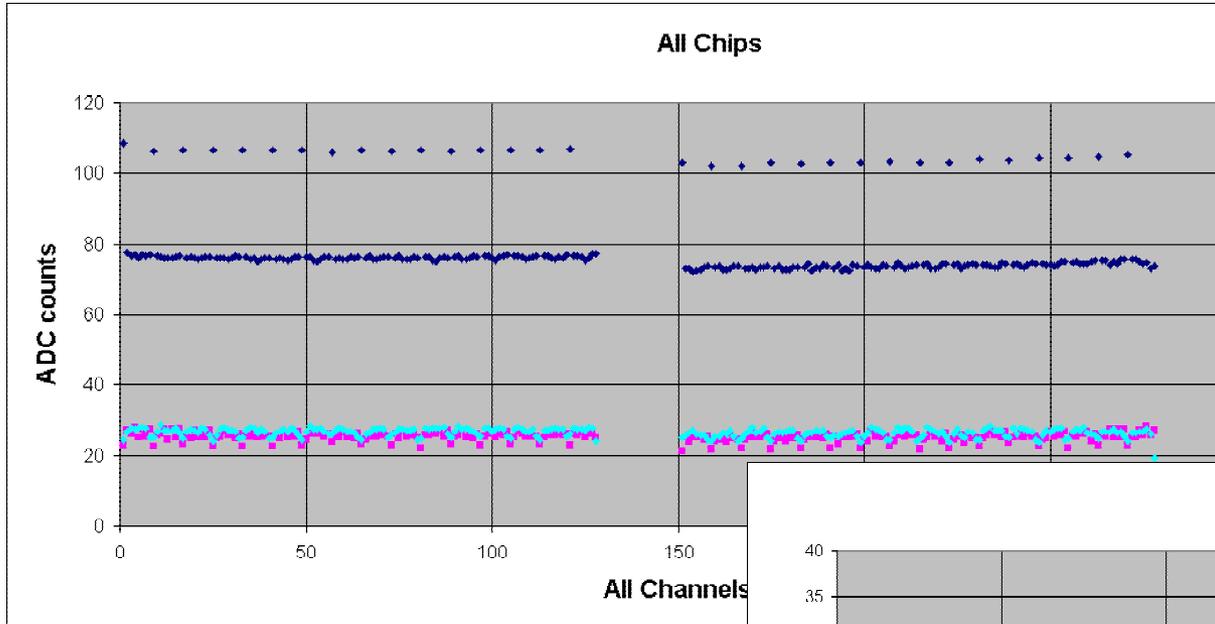
- Assembled and tested 12 new LO hybrids
 - ◆ Used latest revision of SVX - SVX4.2B
 - ◆ Used 1.5 mm profile MOLEX connector planned for new Layer0
- Results are very good
 - ◆ Noise 1 ADC count
 - ◆ Flat pedestals
 - ◆ Plot below shows
 - ▲ Calinjects
 - ▲ Total & differential noise





L0 module with rev.2 hybrids

- Note that module is not in the Faraday cage





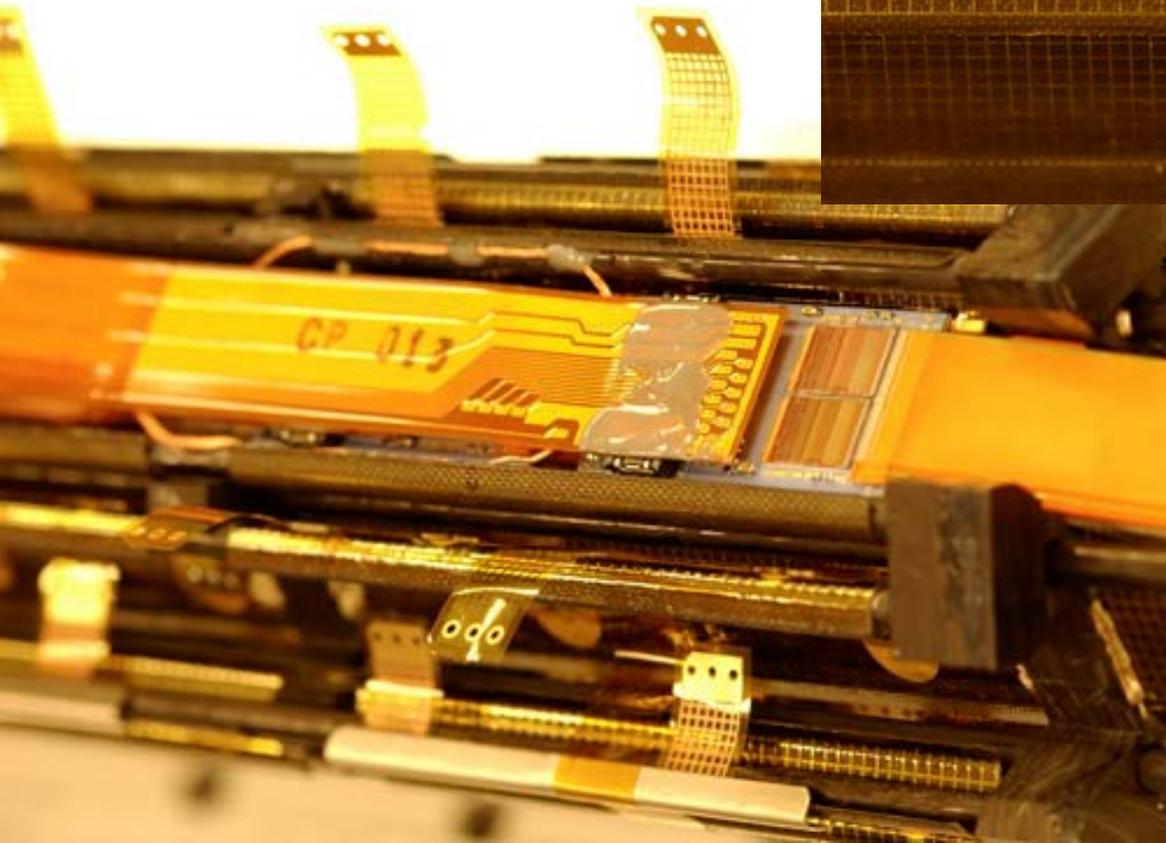
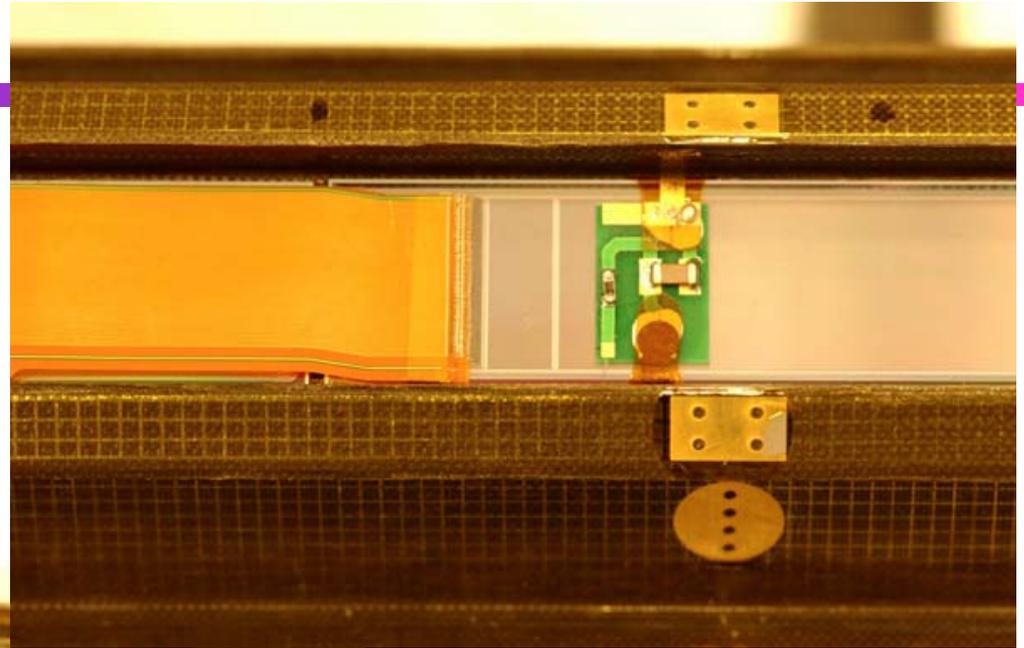
LO modules on Support Structure

- Two rev.1 LO modules mounted on UW support structure in layer OA (smaller R)
 - ◆ ELMA LO sensors
 - ◆ Rev.1 LO hybrids
 - ◆ Dyconex analog cables
 - ▲ longer than we need now
- Assembled 4 new LO modules
 - ◆ All same as above but Rev.2 hybrids
 - ◆ All modules have good performance
- Mounted two modules in layer B (larger R)
- Total four modules were mounted on the Support Structure



LO Module on Support Structure

Sensor region →

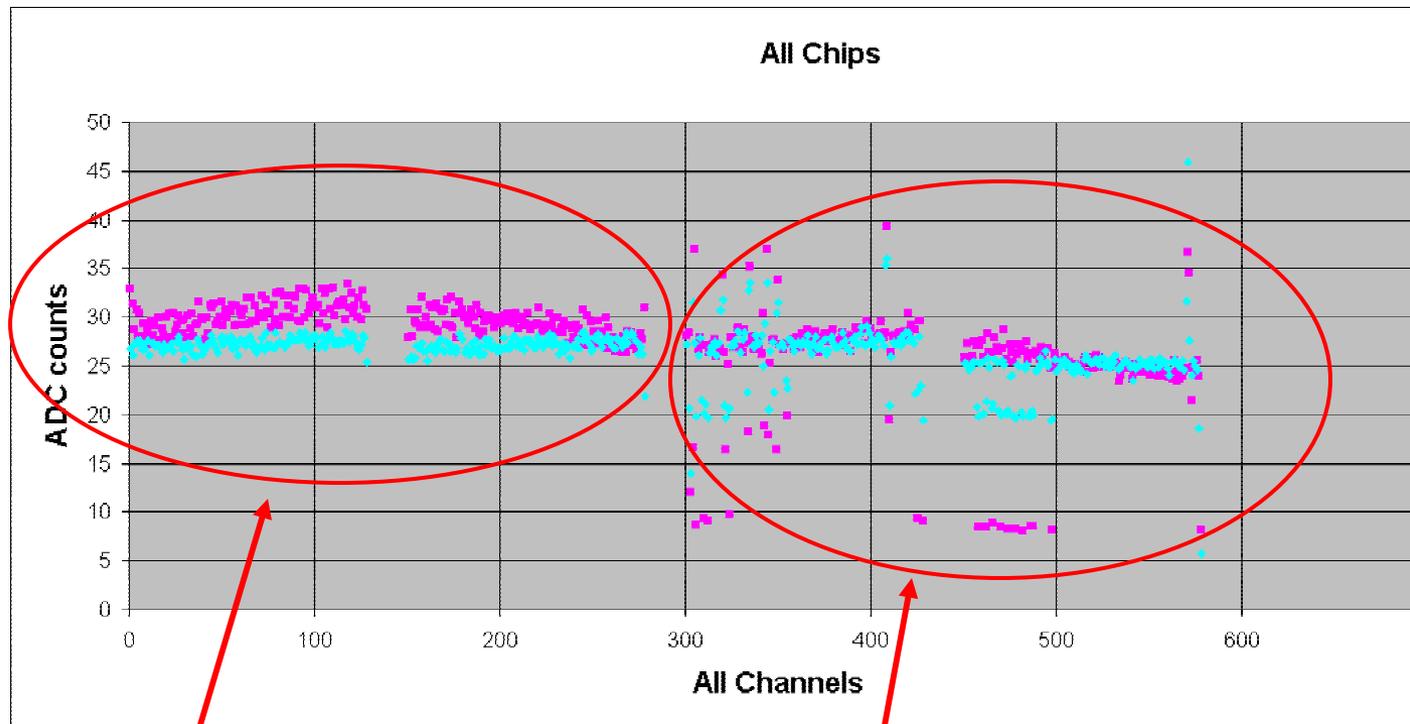


← Hybrid region



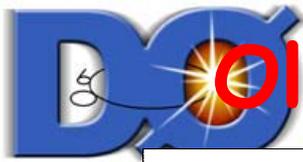
New LO Modules on Support Structure

- Noise practically the same as before - proof of principle for the new grounding approach
 - ◆ No Faraday cage - in fact no shield at all (!)

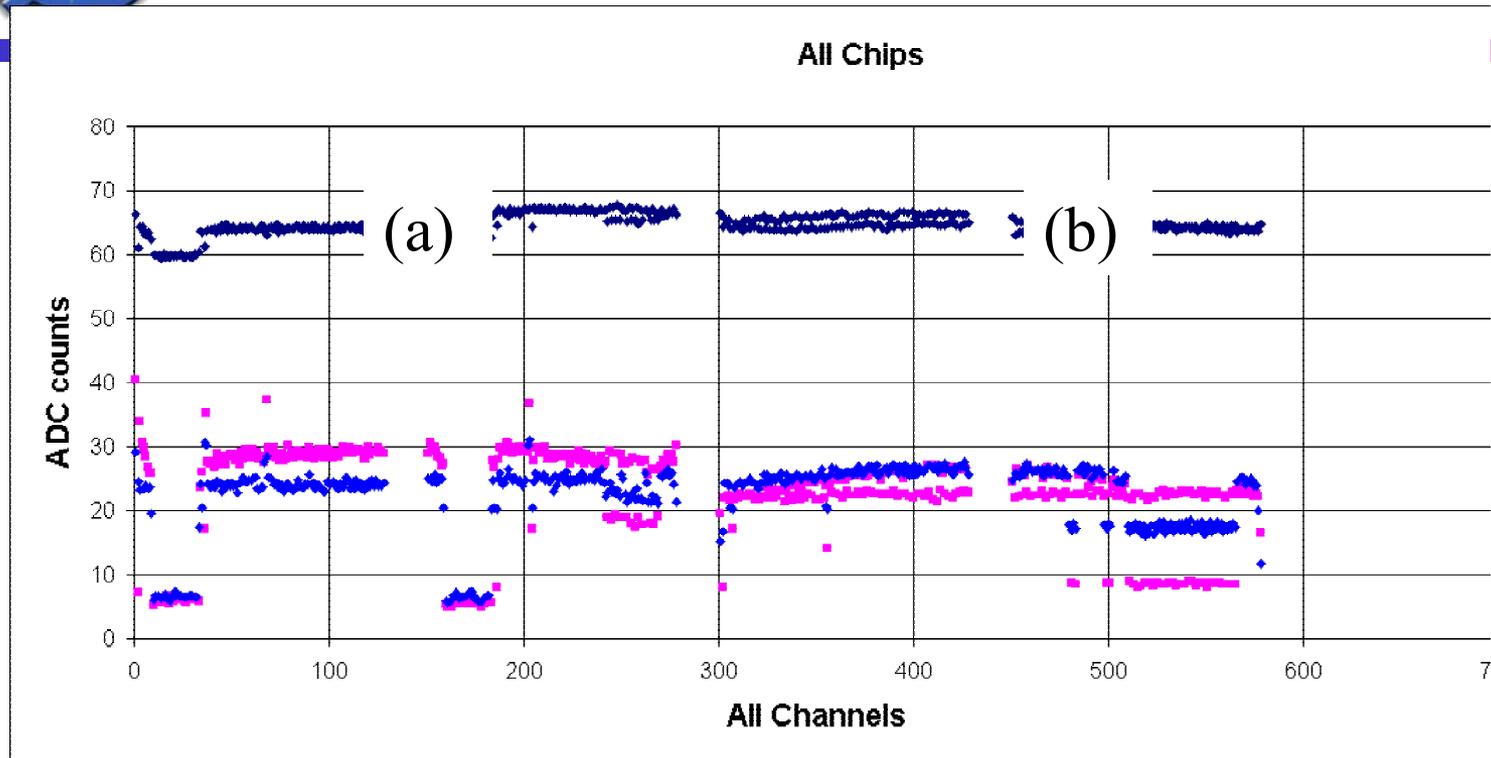


Almost perfect module

Module has two regions with failed bonding



Old LO modules on Support Structure



- Noise slightly worse than for new modules because of longer GND path
 - ◆ Old LO hybrid did not have ground pad on the back and needed to be grounded by a wire. Module (a) has longer wire, module (b) has shorted wire



Summary

- We are on track for Run2B closeout
 - ◆ Sensor/Hybrids/L2-5 module closeouts complete
 - ◆ Would like to assemble another stave with new SVX4 chips
- Closeout for original Run2B Layer 0 produces very useful information for the new Layer 0 project
- L0 and stave results will be reported at the APS meeting next week
- We are within budget for the closeout