

SiD Tracking Hardware R&D Status at SLAC

Tim Nelson - **SLAC**

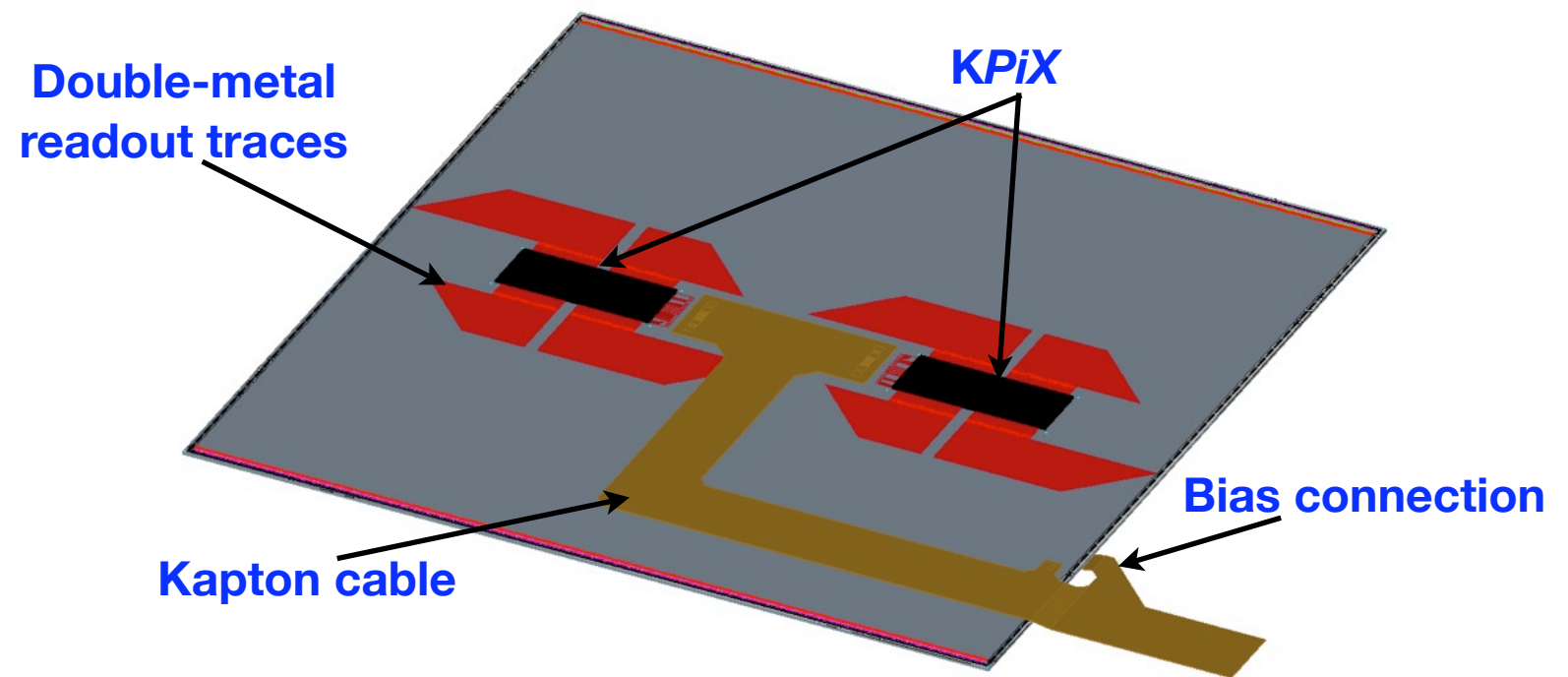
January 11, 2008



Module Development at SLAC

The key issue to be resolved this year was the viability of the double-metal readout scheme. This requires a full prototype.

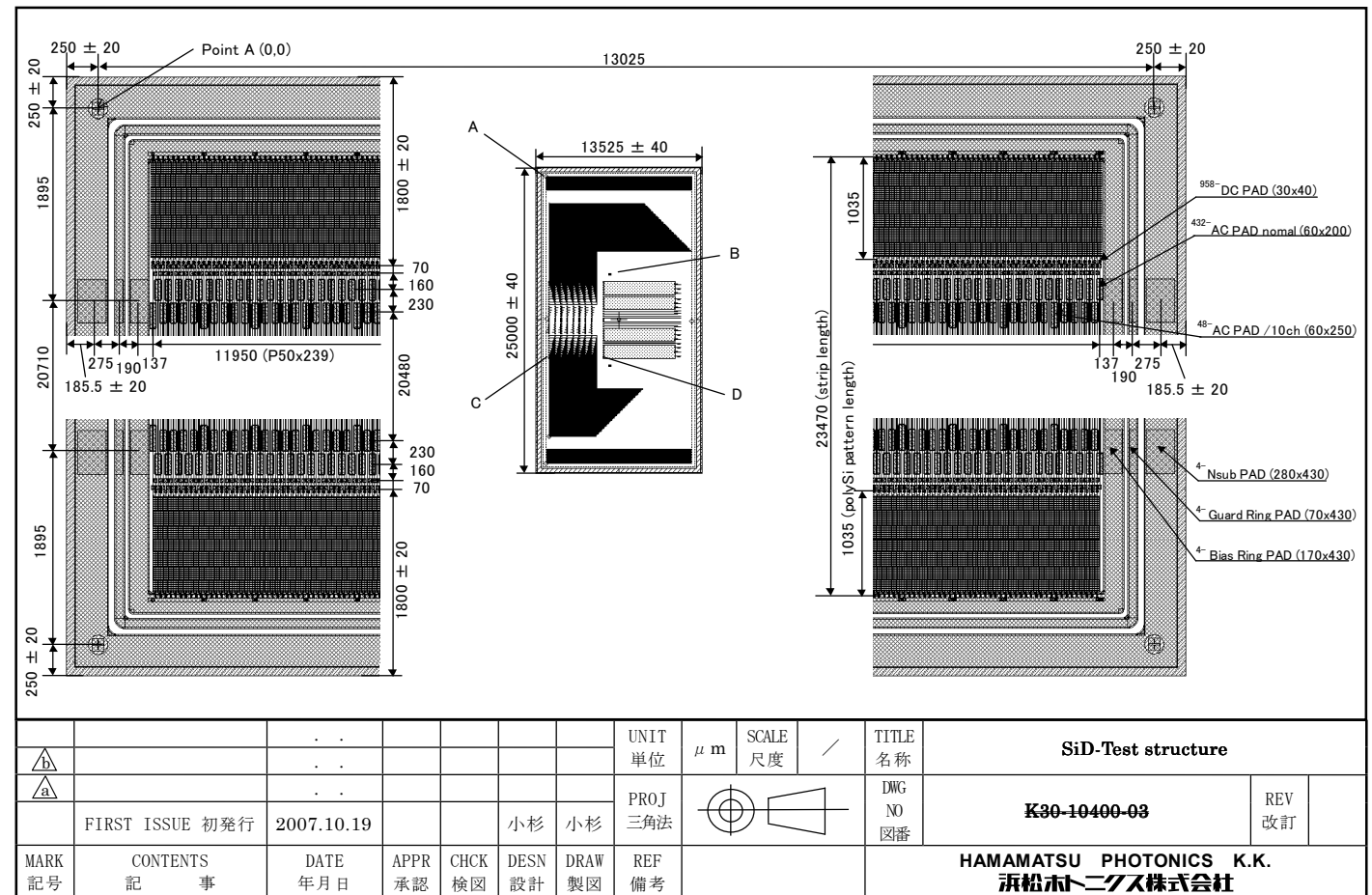
- 🔺 Sensors
- 🔺 Readout Chips
- 🔺 Cables
- 🔺 Assembly
- 🔺 Test Equipment
- 🔺 Mechanical Support



Jacques Chauveau had agreed to take on a leading role in testing.

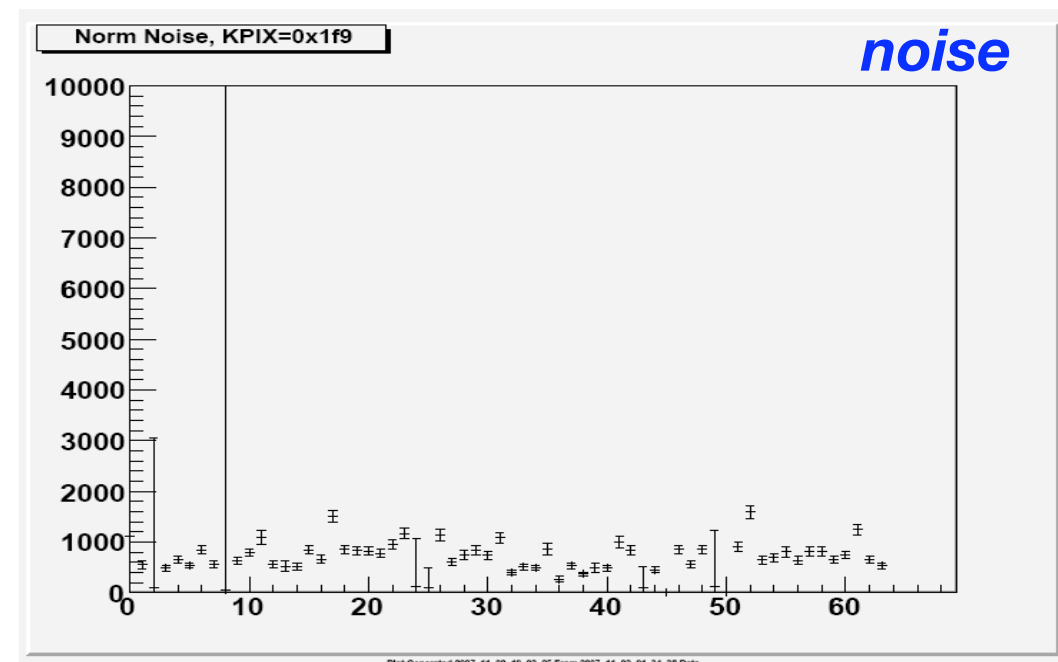
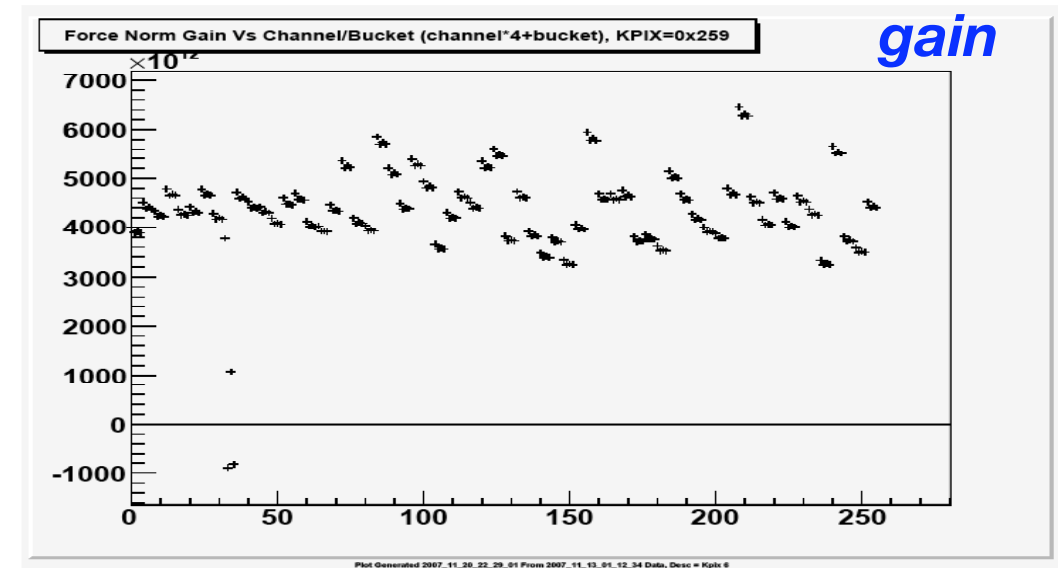
Sensors

- Submitted, HPK design work complete
- Mask layout underway in Dec.
- Expect sensors ~March-April
- Full-sized sensor requires at least KPiX512 to test for clock pickup
- Inclusion of test sensor allows this test with KPiX64



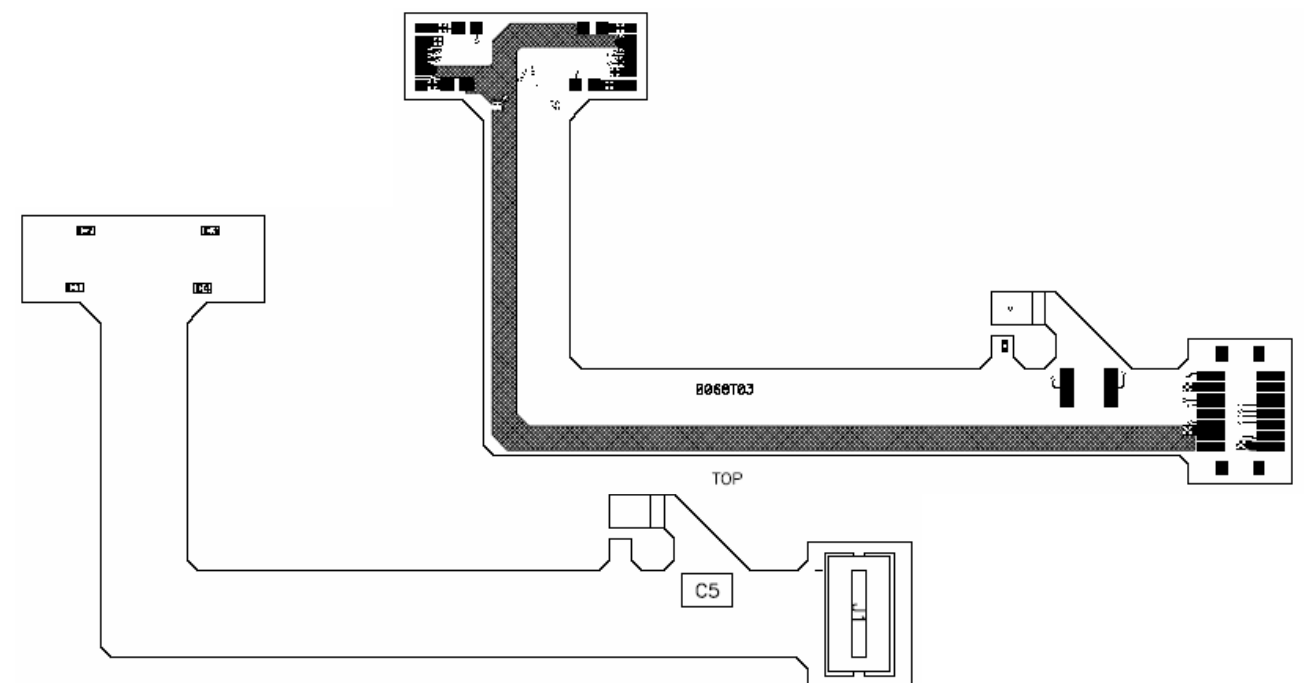
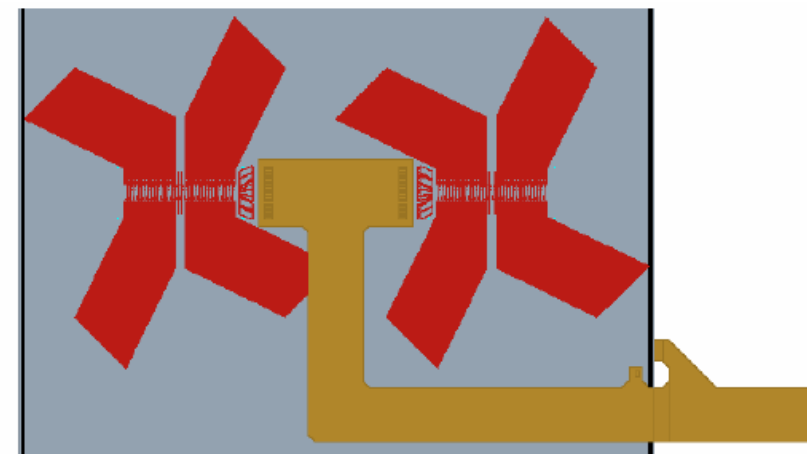
KPiX

- ❏ KPiX5, KPiX6 are major improvements
- ❏ KPiX5 achieves roughly the expected noise performance in the trigger branch
- ❏ Digital crosstalk problems necessitate low DVDD operation. Problem is understood but KPiX5 less than ideal for serious testing
- ❏ Noise from ADC still nearly 2000 electrons: by far largest problem not yet understood
- ❏ Still plan a KPiX7 to address these: a big push is on to figure out the ADC noise before February submission.



Readout Cable

- Prototype cable design by UNM
- We still need to provide some feedback on this: in contact with Martin this week to sort these issues out
- Fabrication costs are small enough that I believe we should still be able to cover this cost (~5K?)

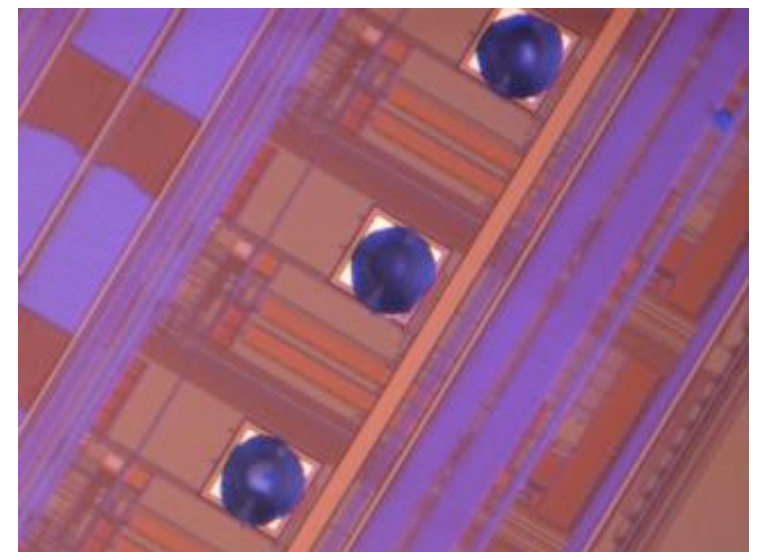


Assembly Issues

- ❏ Only major issue is KPiX bump bonding
- ❏ UC Davis has submitted parts to Palomar for gold-stud bonding
- ❏ This looks promising but still don't know the status of things at Davis and this prototyping is not cheap.
- ❏ This is a critical process to complete the readout R&D

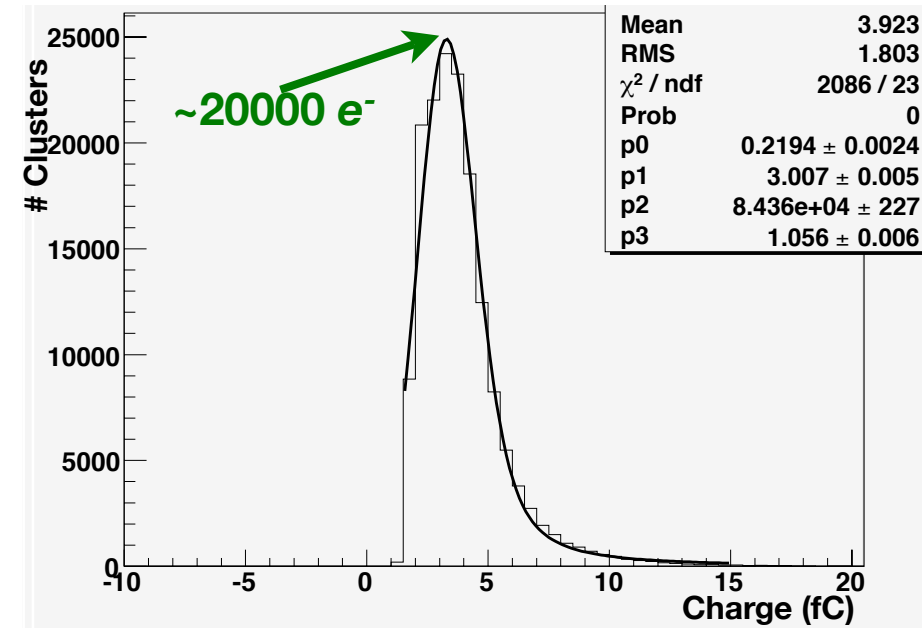
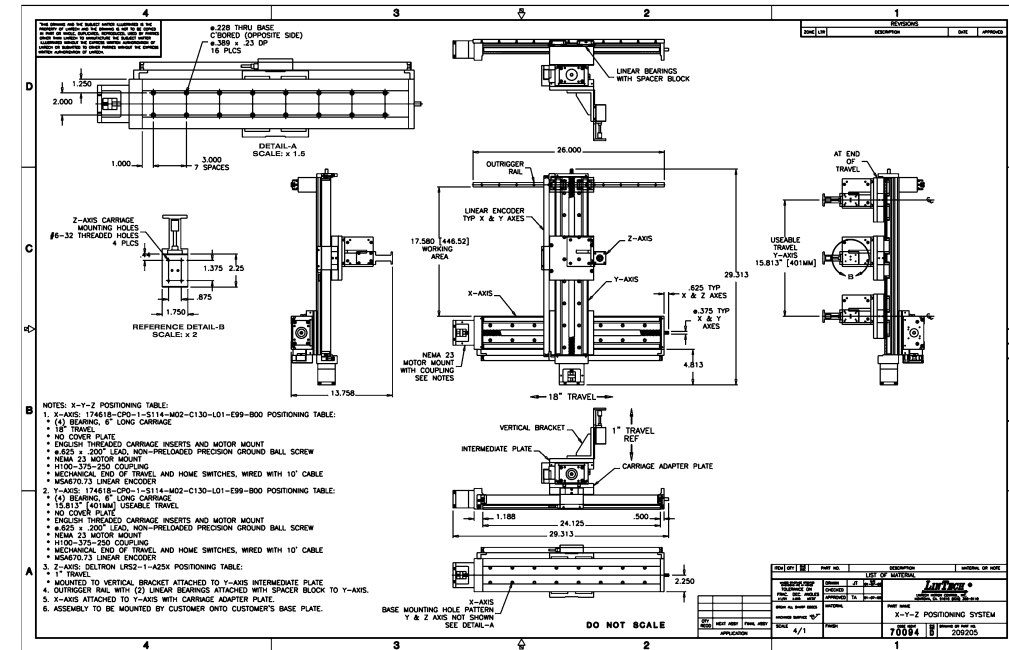


gold stud bumping
on KPiX



Testing Opportunities

- ⬢ Conversion of a lab to silicon cleanroom was already funded and currently is still underway
- ⬢ Have already ordered parts required for a laser test stand. Qingmin Zhang to take on the completion and commissioning
- ⬢ Test beam in ESA is still being planned. Assuming original schedule of late May.



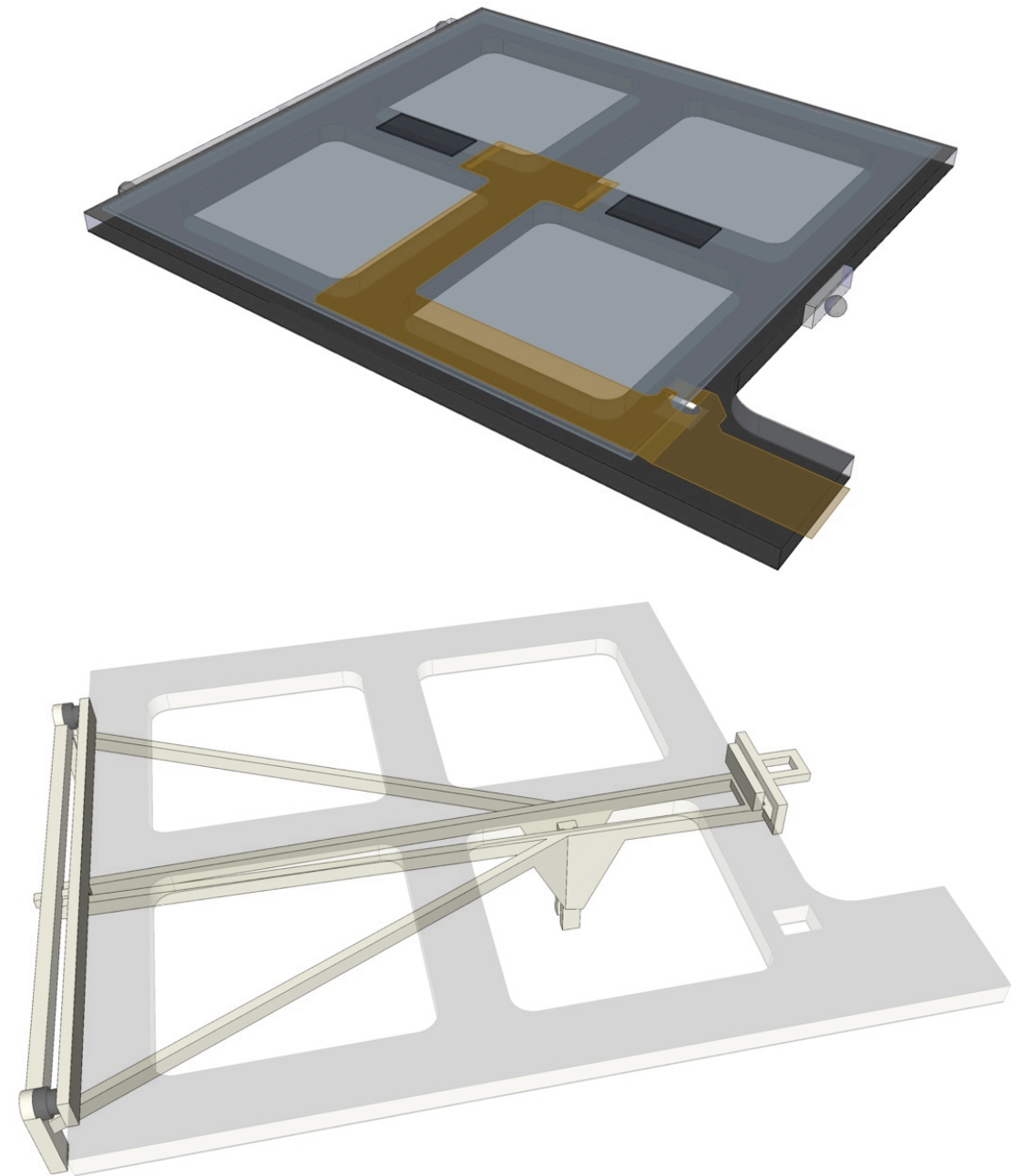
Mechanical

- ❏ Will use simple one-off support for readout testing

- ❏ Had also planned to do some small-scale prototyping of realistic support structures.

- ❏ Rapid prototyping is relatively cheap (<\$1K)

- ❏ This would be a nice to thing to show in a CDR



Summary

- Very close to addressing the critical questions for baseline SiD readout scheme: we should try to complete this work
- Quite a bit of new progress since Beijing to be documented in some way
- I believe we will have the resources to cover the critical tasks at SLAC, but we will need the help of key collaborators, esp. Davis and UNM.
- If by some miracle the ILC survives, we are in relatively good shape.

