



# US Module Testing Progress Report

- New infrastructure
- Tests of new hybrids
- Current Through-put
- Needs for increased through-put



# New Infrastructure

Large amounts of testing equipment **arrived** or **on route** to US

*Thanks to everyone for all the hard work getting us these needed components*

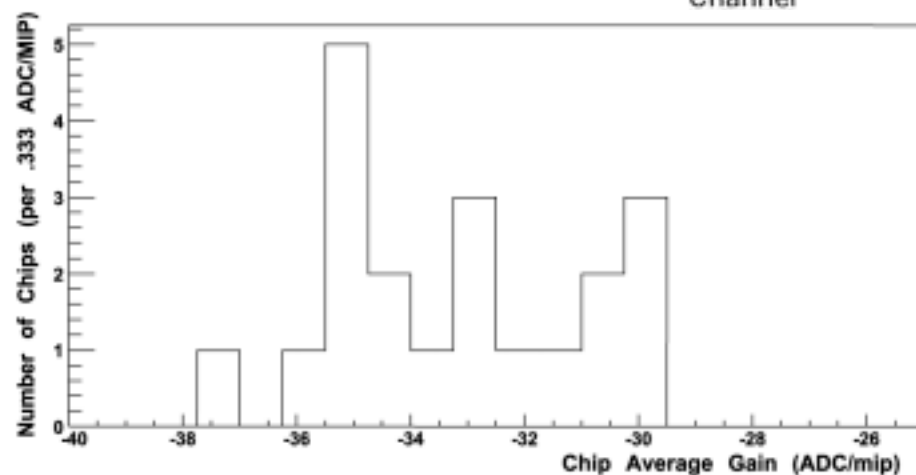
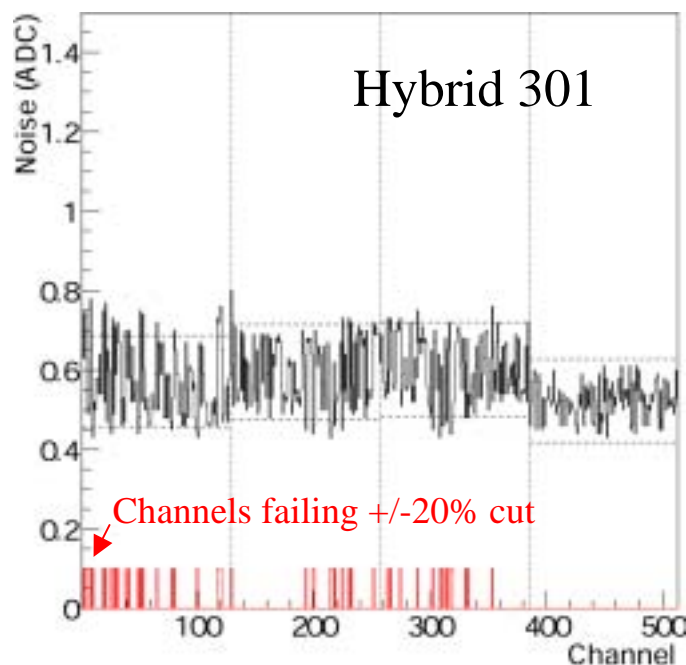
- **ARCS equipment**
  - ➔ 3 ARC Controllers
  - ➔ 8 new ARC FE
  - ➔ 2 LED systems
  - ➔ 1 DEPP
- **DAQ equipment (to UCSB)**
  - ➔ 1 TSC
  - ➔ 1 FED
  - ➔ 1 FEC
  - ➔ 1 CCU
  - ➔ 1 MUX crate with 3 MUX boards
- **Hybrid-to-utri adaptors**
  - ➔ 6 version B & 2 version D
- **Cold box equipment**
  - ➔ First cold box just shipped
  - ➔ 2 Chillers on route
  - ➔ LV on route
  - ➔ HV controllers (HS CAENET and VME) on route
  - ➔ 8 electrometer channel on route
- **Other infrastructure**
  - ➔ All LV for hybrid/module test ordered

We are working as fast as possible to integrate this needed equipment



# Tests of new hybrids

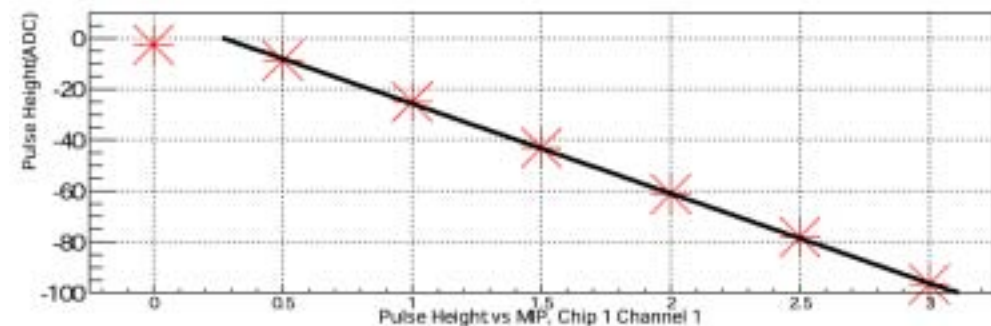
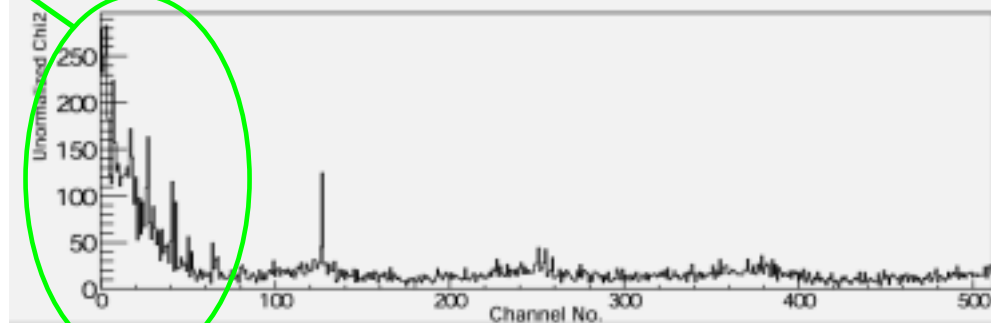
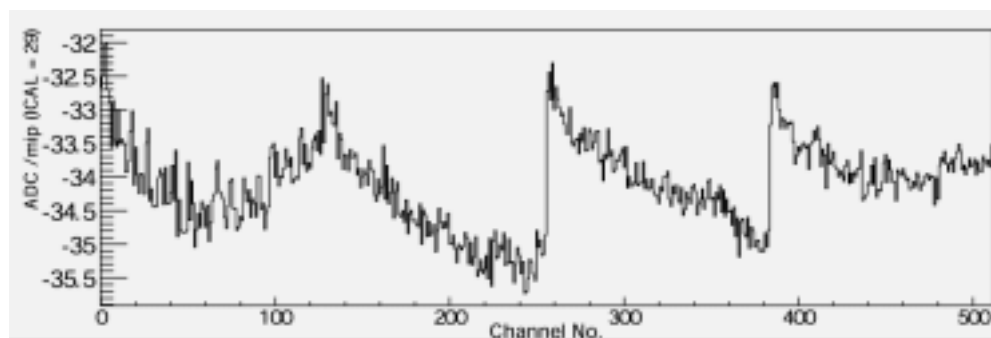
- 5 new hybrids tested at UCSB
  - ➔ All in working condition
  - ➔ But all would fail grading due to wider noise at UCSB
    - Under investigation (Will make short write-up in next week)
- All 5 had gain measured
  - ➔ Average chip gain seems to be grouped (different wafers??)
    - Low statistics
  - ➔ 1 chip has 60 channels with no pulse seen with injections up to 0.3 MIP (see next slide)
  - ➔ 2 of 24 chip measured so far have this effect
- Pitch-adaptor to APV bonding beginning on these hybrids (UCSB)
- **All 11 hybrids tested and PA bonded with no problems at FNAL**





# Tests of new hybrids (2)

- Measured multipoint gain on all chips
  - ➔ 1 chip has 60 channels with no pulse seen with injections up to 0.3 MIP (on hybrid 301)
  - ➔ 2 of 24 chip measured so far have this effect
- Not yet clear if it is an calibration, pre-amplifier, software, or environmental effect
- We will measure all hybrid received at UCSB for this effect to get larger statistics





# Current Testing Through-put

## UCSB

- Only 1 ARC stand with 1 FE channel at a time
  - ➔ 16 hybrid characterization or
    - Limited by gain scan and manipulation of files for local “database” and gain analysis
  - ➔ 0 hybrid thermal cycle/PA pulsing
    - Lack test stand and software
  - ➔ 8 module fast test
    - Lack LED hardware and IV scan software
    - By hand could do about 8 modules a day (Grading criteria still not final)
- Module burn-in, rod assembly and rod burn-in are missing hardware and software elements
  - ➔ All actively under development

## FNAL

- Current equipment on-hand
  - ➔ 2 ARC Test Stands
    - 1 LED system
  - ➔ 2 DAQ Test Stands
- M800
  - ➔ 11 hybrids on-hand (w/PA and bonded), already tested, all working well
  - ➔ 3 modules/week (until more components arrive, then production will be stepped up accordingly)



# Current Limits of Through-put

- **Hybrid/module tests not completely automated**
  - IV scan, gain scan, database, etc.
  - Thanks to Aachen (T. Franke, et. al.) for all the effort being put into this
- **Lack of complete set of equipment**
  - Aachen is delivering about half of complete order as we speak
  - First set of DAQ components arrived at UCSB last week
    - Rest being sent as quickly as possible
  - Mechanical drawings of hybrid thermal cycle box (CERN) sent last week
    - Will start working on production of box for US
- **Lack of module thermal cycling (Vienna box)**
  - Vienna box was shipped earlier this week
  - Electrical components are arriving over next few weeks/months
    - Will have enough to start 2-3 module test run soon
  - Mechanical modifications for TOB plates will start at UCSB as soon as delivered
  - Multi-module software nearly ready
    - Patrick Gartung (UC-Riverside) working to compile/run software at UCSB



# Estimated Peak Necessary Testing Through-put

## UCSB

- **Hybrid Fast Test and Characterization**
  - ➔ Receives all US hybrids w/o PA bonded
  - ➔ 24 hybrids/day
- **Hybrid Thermal Cycle/ PA pulsing**
  - ➔ Receives all US hybrids w/o PA bonded
  - ➔ 24 hybrids/day
- **Module Fast Test/Characterization**
  - ➔ 12 modules/day
- **Rod Assembly**
  - ➔ 2 rods/day
- **Rod Burn-in**
  - ➔ 16 rods/week

## FNAL

- **Hybrid Fast Test**
  - ➔ 12 hybrids/day
- **Module Fast Test/Characterization**
  - ➔ 12 modules/day
- **Rod Assembly**
  - ➔ 2 rods/day
- **Rod Burn-in (3 days)**
  - ➔ 16 rods/week
    - Large back-log of modules necessitates more than 10 rods/week capability

Matches peak rate of 12 modules a day produced at both sites. Assumes separate module burn-in is not necessary. Should be achievable



# Estimated Possible Future Testing Through-put

Estimates based on all equipment being functional 8 hours a day, 5 days a week.

Setup/testing times are uncertain as tests are not finalized as of yet.

Assumes worst case in which all modules will have to be burnt-in and retested prior to mounting on rods.

Both site have slight over-capacity which will allow for removal of any testing back-logs or for failure of small portion of testing equipment

- **Hybrid fast test and characterization (UCSB only)**
  - ➔ 30 hybrids/day
    - Need 24/day at peak production
- **Hybrid thermal cycle/PA pulsing (UCSB only)**
  - ➔ 40 hybrids/day
    - Need 24/day at peak production
- **Hybrid fast test on arrival (FNAL only)**
  - ➔ As much as necessary
- **Module Fast Test**
  - ➔ 20 modules/day
    - Need 12/day at peak production
- **Module Burn-in (1 day)**
  - ➔ 10 modules/day
    - To burn-in all modules at peak rate requires weekend shifts
- **Module Characterization**
  - ➔ 15 modules/day
    - Need 12/day at peak production
- **Rod Assembly**
  - ➔ Time necessary for rod assembly/testing very uncertain
- **Rod Burn-in**
  - ➔ 16 rods/week
    - Need 10/week at peak production



# Conclusions

- Hybrids sent to UCSB/FNAL all look great
  - ➡ Final details of testing to be understood
- Pitch adaptor-APV bonding has begun
  - ➡ Module production will follow shortly thereafter
- We are still short of complete set of equipment necessary for production testing
  - ➡ But we are rapidly receiving and integrating the new equipment