Test Bench Status

Claudio Campagnari
(for the UCSB group)

OUTLINE

- **Test bench components (reminder)**
- **Measurements of noise**
- **Measurements of gains/intercepts**
- **Status of DFA with 7x7 HDI for test beam**
- **Proposal for (minor) modifications to test beam plan**
- **Plans for continuation of bench tests**

TEST BENCH COMPONENTS

- **Forward type-B layer 2 DFA**
- **HDI, 3 rad-soft chips/side**
- **Prototype wire-wrap matching card (have a PC version, not used yet)**
- **Prototype wire-wrap HDI-link and DAQ-link cards (transistor-based level shifting)**
- **Prototype LBL-DAQ board, MVME 1604 computer**
- **Bench power supplies. Andrei Smol (Torino) arrived yesterday; will switch to CAEN supplies soon**

- **Substituted home-made system for tail. Berg on HDI–kapton circuit –Berg on PC board with card-edge connector–cable harness–PC board with card-edge connector and Berg–kapton circuit–Berg on matching card**
- **Have received new tails Monday, not tested yet**
- **Initially bonded two groups of 15 known good strips on either side**
- **This week bonded two groups of 60 strips on ϕ-side, one group of 60 strips on z-side. These include pinholes. Shorts to floating strips not bonded**

MEASUREMENTS OF NOISE

- **40 MHZ clock, 100 nsec shaping time**
- **Noise extracted from threshold turn-on curve for fixed charge injection**
- **Fire 1 channel at a time**
- **Assume 1 threshold count $\approx$ 400 electrons**
- **Noise on unbonded strips $\approx$ 300 electrons**
- **Initial measurements, bonded strips:**
  $\approx$ 1700 ENC ϕ-side (n-side),
  $\approx$ 900 ENC z-side (p-side)
- **Predictions from I. Kipnis:**
  $\approx$ 810 ENC ϕ side,
  $\approx$ 660 ENC z-side

- **Systematic variations at $\approx$ 20% level run-to-run. May be correlated with activity in lab ?**
- **Evidence for correlated (coherent) noise (see later)**
- **VERY NEW AND PRELIMINARY. Last night first look after**

  (1)bonding more channels

  (2) replacing cable-harness etc. with new version.

  Noise:

  $\approx$ 1000 ENC ϕ-side,

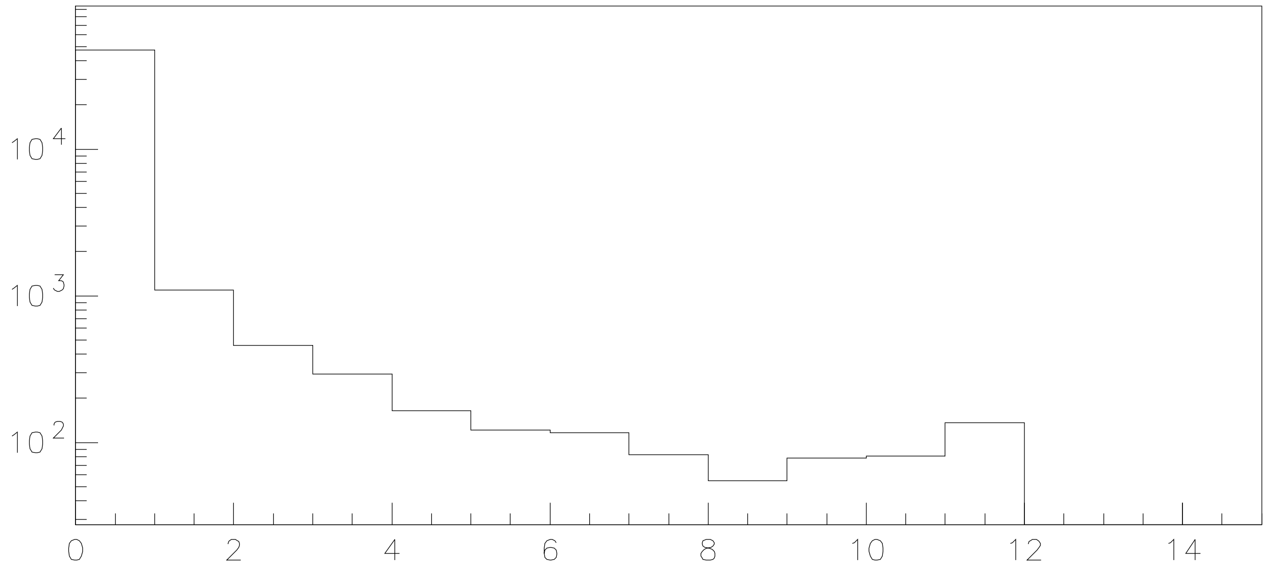
  $\approx$ 750 ENC z-side.

  NEEDS TO BE CONFIRMED

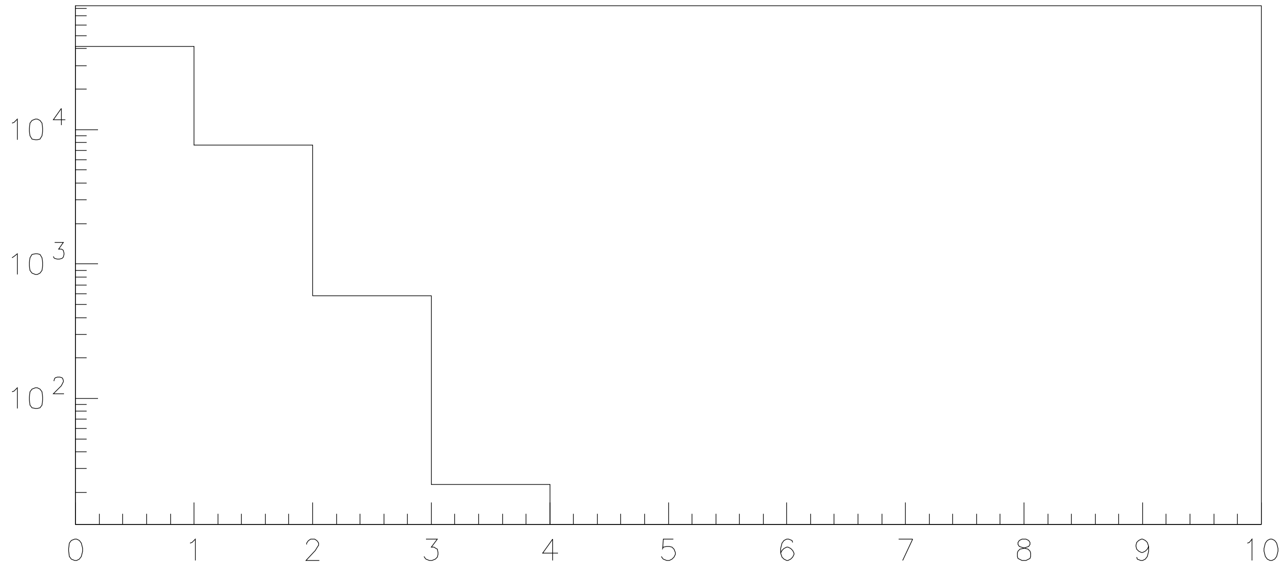
EVIDENCE FOR CORRELATED NOISE

- **Test done BEFORE recent changes (i.e. *high* noise situation**
- **No charge injection. Set threshold at noise hit rate of $\approx$ few %**
- **Take many (50K) events. Compare distribution of number of hit channels/event with expectation for uncorrelated noise**
- **Find excess of events with multiple channels hit (see Figure)**

N-SIDE



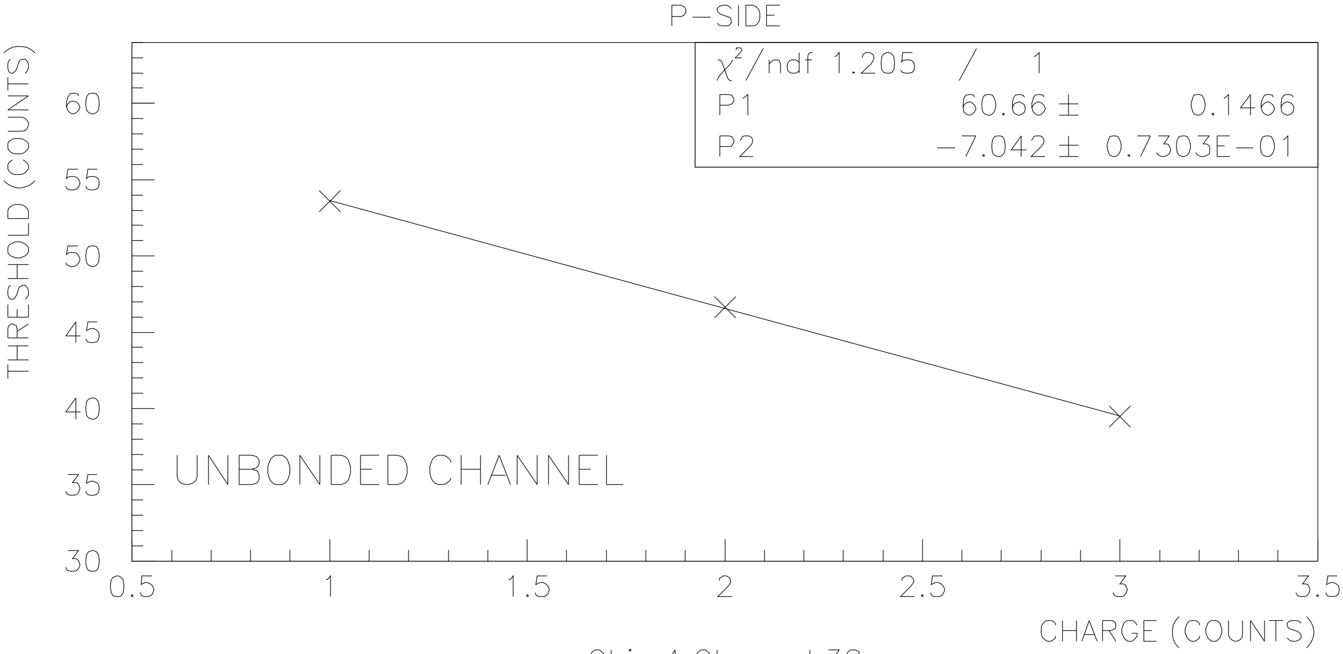
OBSERVED NUMBER OF HITS DISTRIBUTION



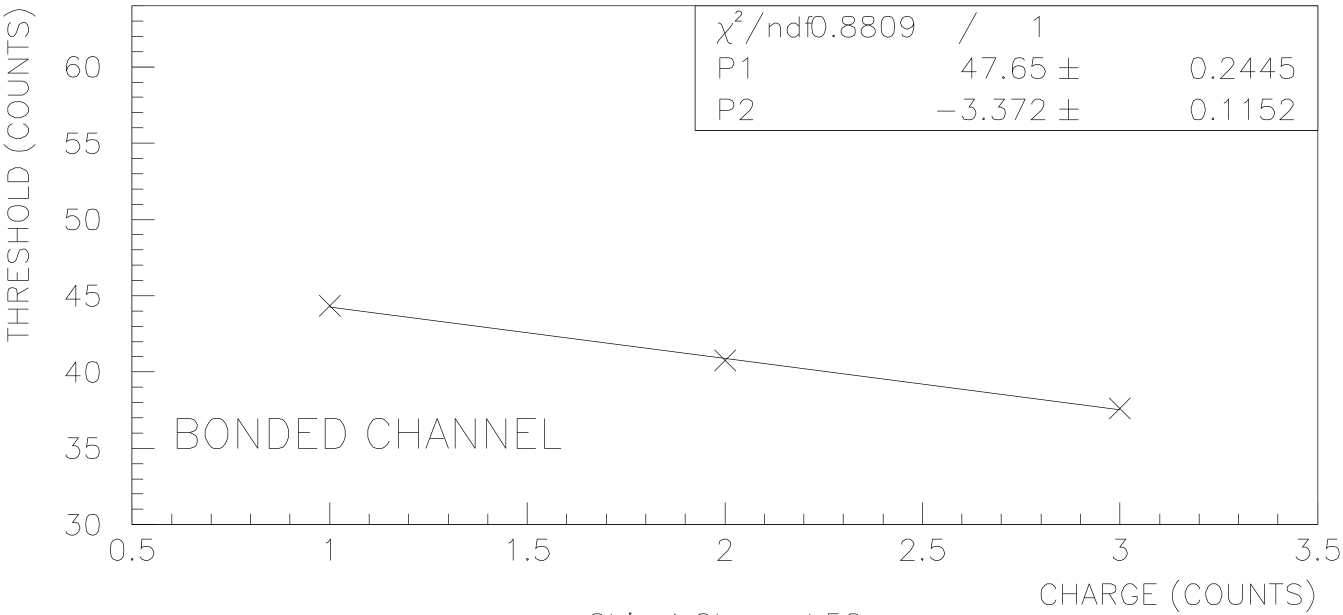
PREDICTED (MONTE CARLO) NUMBER OF HITS DISTRIBUTION

MEASUREMENTS OF GAINS/INTERCEPTS

- **Plot 50% threshold point as a function of value of charge injection**
- **Slope = Gain**
- **Intercept $\approx$ Pedestal**



Chip 4 Channel 38



Chip 4 Channel 52

- **Observe shift in intercept and slope for bonded channels**
- ϕ**-side:**
  slope changes by $\approx$ 9%
  intercept changes by $\approx$ 7%
- z**-side:**
  slope changes by $\approx$ 50%
  intercept changes by $\approx$ 18%
- **??**

Status of DFA with 7x7 HDI for test beam

- **Started looking at 7x7 HDI**
- **Water cooled. T$\approx 40^o$C (no chiller; delivered yesterday).**
- **All chips are alive. One chip always reads back masks=0. But looks like they are being written OK.**
- **Upilex has been cut. It is being glued to HDI now.**
- **Internal UCSB schedule shows test-beam module shipped to Europe May 12. Is this OK?**

Proposal for (minor) modifications to test beam plan

- **Original plan:**
  Testbeam module = two type-B layer 2 DFA+HDI.
  Forward with 3x3 HDI.
  Backward with 7x7 HDI
- **Propose to keep 3x3 DFA+HDI at UCSB to continue testing.**
  Substitute it with type C or dummy for test beam

Plans for continuation of bench tests

- Switch to CAEN power supplies (this week)
- Continue with noise measurements and studies
- Characterize effects of bad channels (pinholes, shorts etc)
- Complete test and characterization of 7x7 HDI+Si
- Test new tails from Milan
- Test PC version of matching card
- Understand slope/intercept shifts
- Install water chiller for 7x7 HDI and HDI+Si test
- Speed up software

- **Understand some *peculiarities*, e.g. bonded channels that behave as unbonded even though visually OK**
- **Study effect of carbon fiber ribs**
- **Begin LED scans**

WE ALSO WOULD LIKE TO UNDERSTAND WHAT COMPONENTS OF THE TEST BENCH WE CAN KEEP, AND WHAT COMPONENTS WE ARE SUPPOSED TO SHIP TO CERN (e.g. HDI-LINK, DAQ-LINK, MATCHING CARD, UCSC CABLES).