

Update on the NINO-Based Discriminator

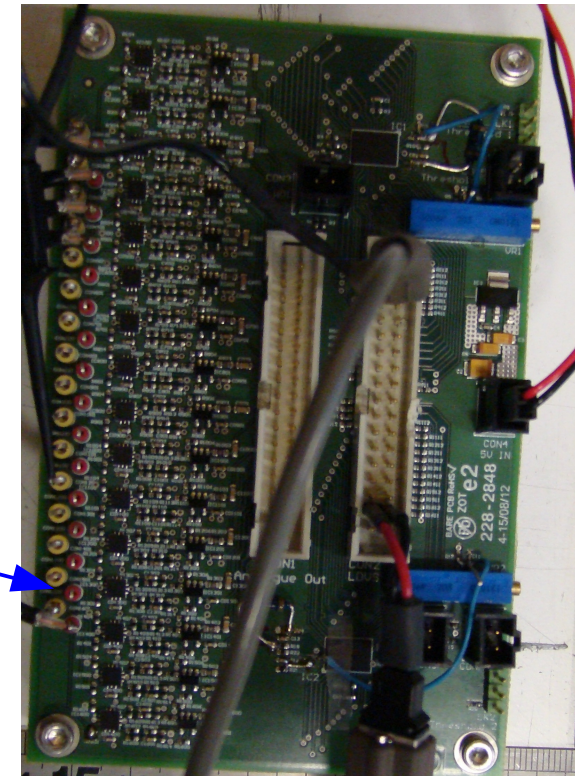
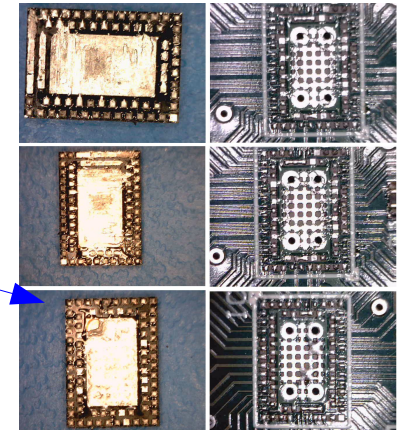
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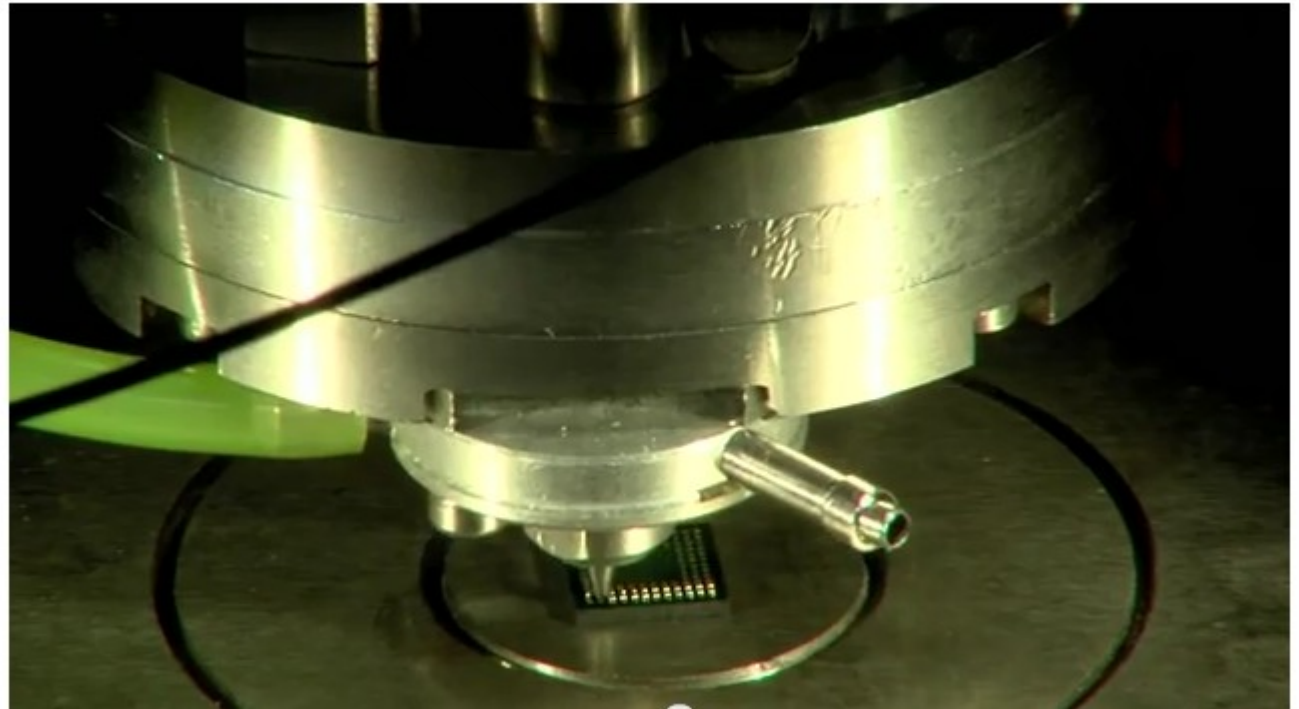
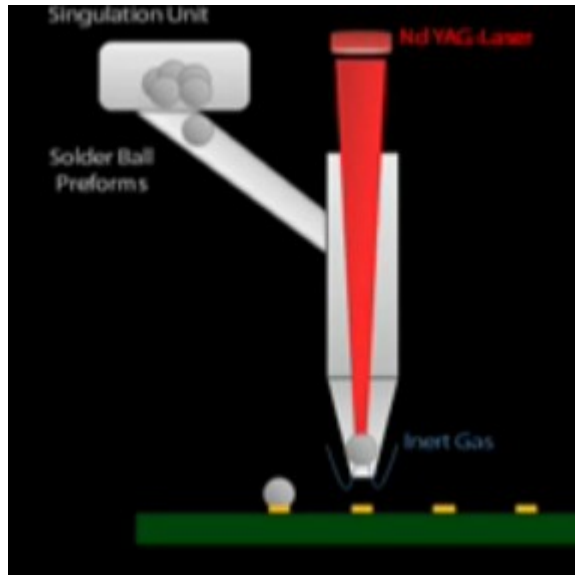
University
of Glasgow

Status

- NINO is an ASIC designed at CERN for the multi-Resistive Plate Chamber (RPC) TOF systems at the ALICE experiment at LHC.
(F. Anghinolfi et al., NIM A 533 (2004) 183–187)
- Some problems previously with attachment of NINO chip to PCB surplus of solder on pads
- 20 NINO chips have been “reballed”
precision deposition of balls of solder on the chip pads
- 4 new discriminator boards produced, 3 populated
hysteresis pins can be connected
- 1 configured for scintillator input all 16 channels
signal attenuated before NINO input
- 2 configured
8 channels scintillator
8 channels “few-photon” (no attenuation of signal)
- Input coax cables RG174, 2-pin IDC connection to board.



Laser Reballing



- Precise deposition of a ball of solder on the pads of a chip
- Laser used: no heating of chip

20 NINO chips reballed by Retronix Ltd., Coatbridge Scotland

Front-end amplifier circuit

Reballing has cured the missing channel problem

Remaining problem with threshold setting
Appears not to be stable
Discriminator misses some inputs

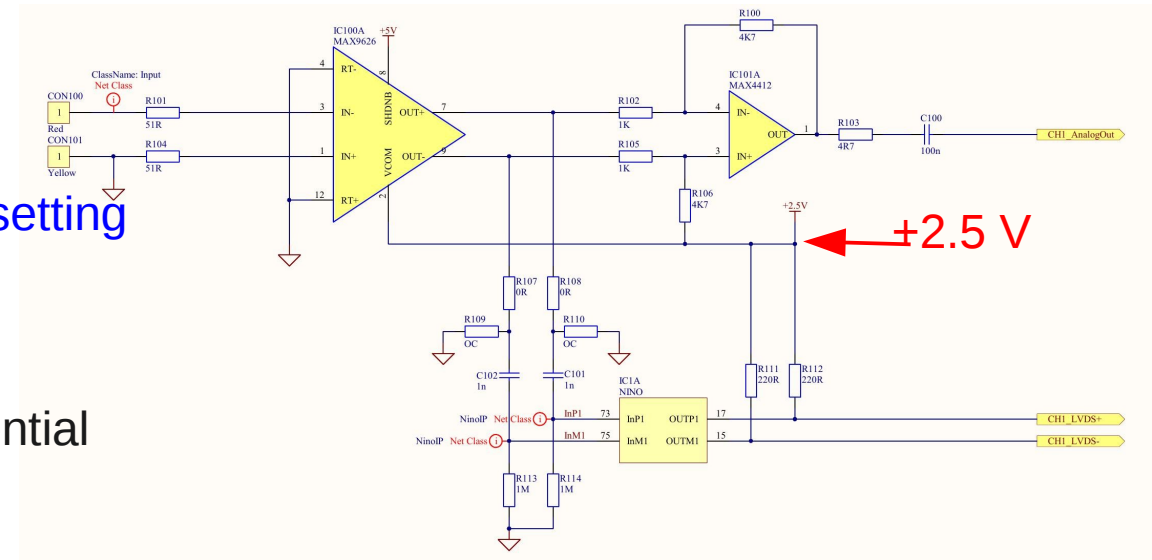
Checking effects of offset on differential
Threshold voltage

Checking effects of hysteresis

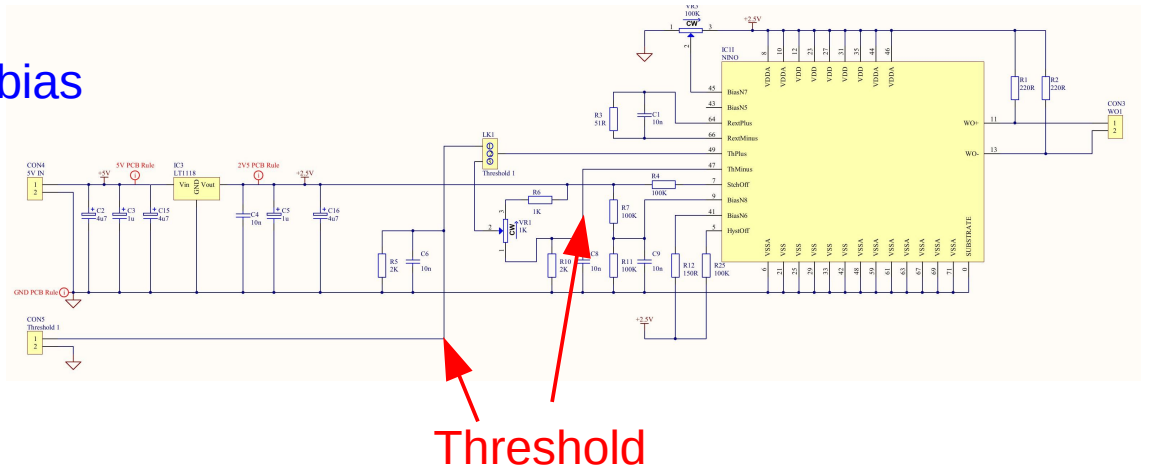
~10 mV “ripple” on amplifier output
correlates with firing of discriminator

2.5V supply to NINO also provides bias
Offset to input amplifier.
Amplifiers run from +5V,
input signals -ve

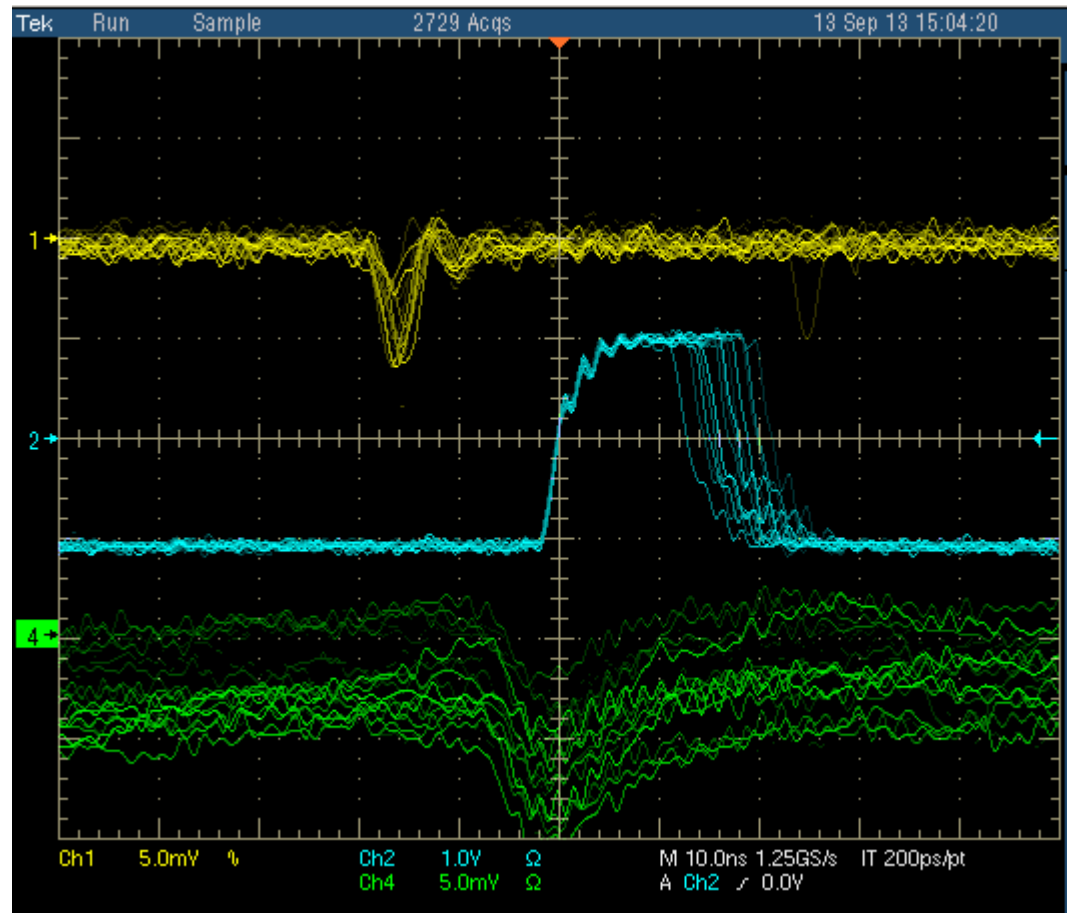
1 board send to Igor Rachek
for debugging



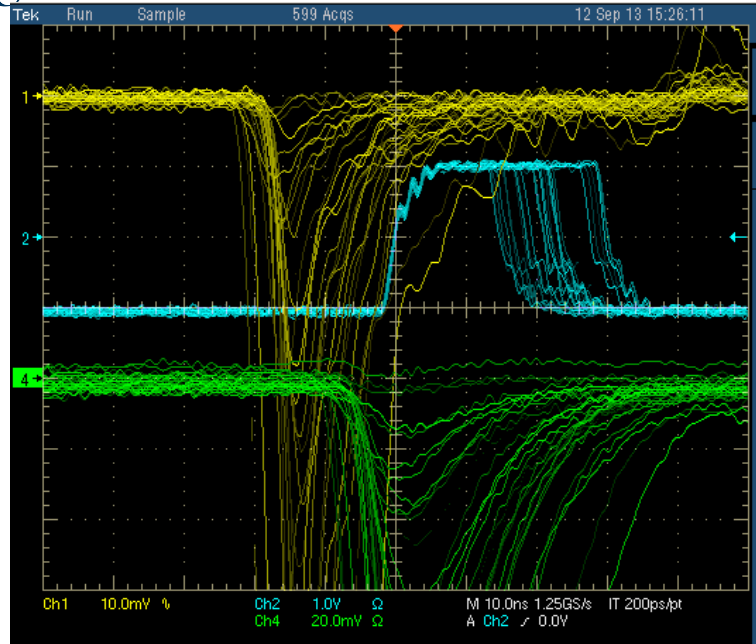
NINO control circuit



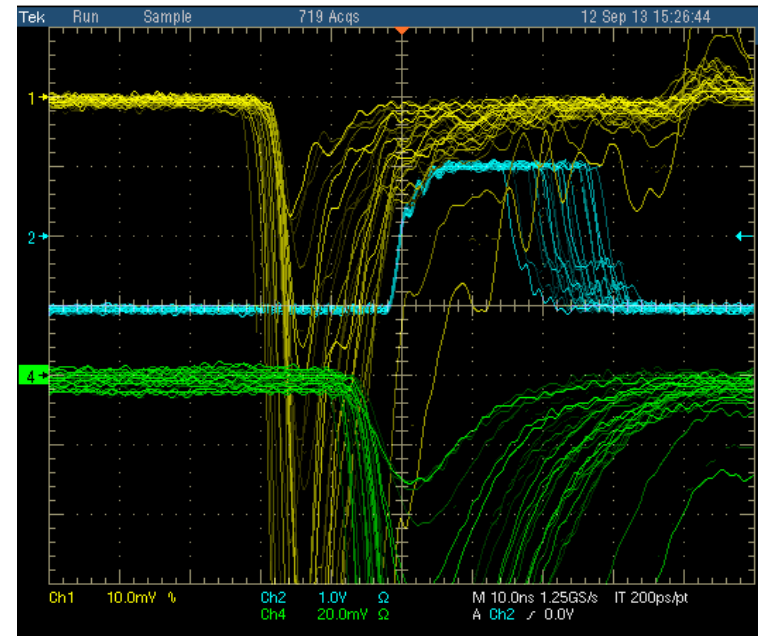
Triggering on \sim single-photon dark noise from PMT (no scintillator attached)



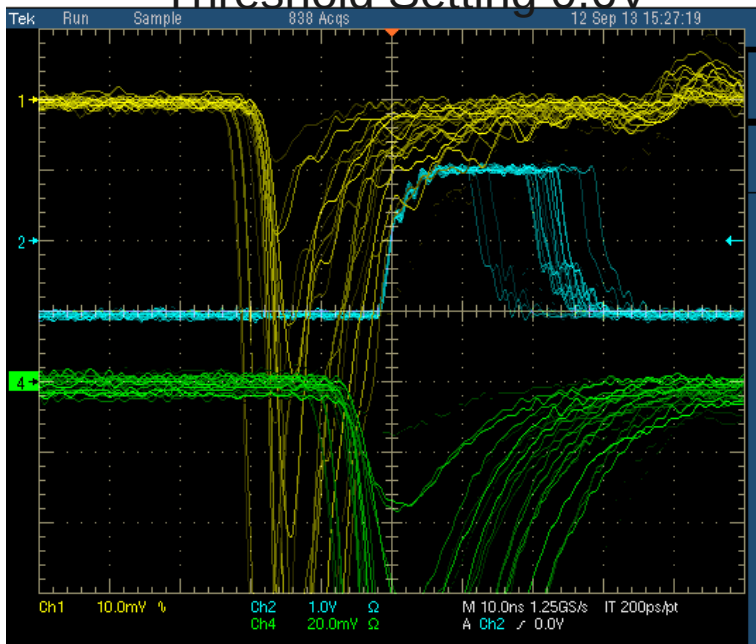
Threshold Setting 0.4V



Threshold Setting 0.5V



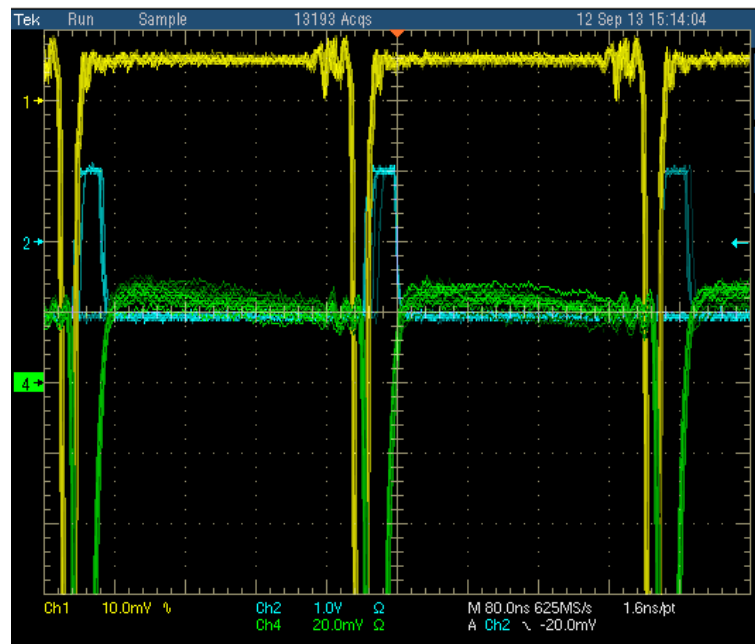
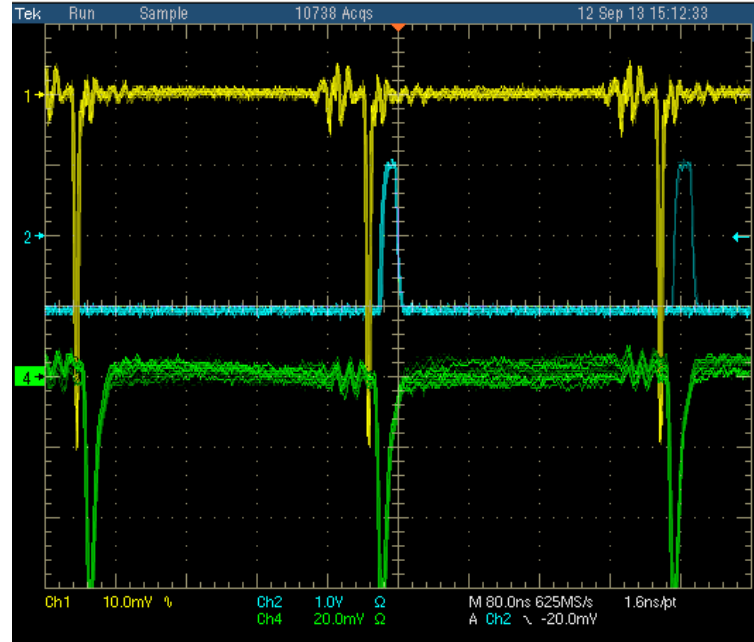
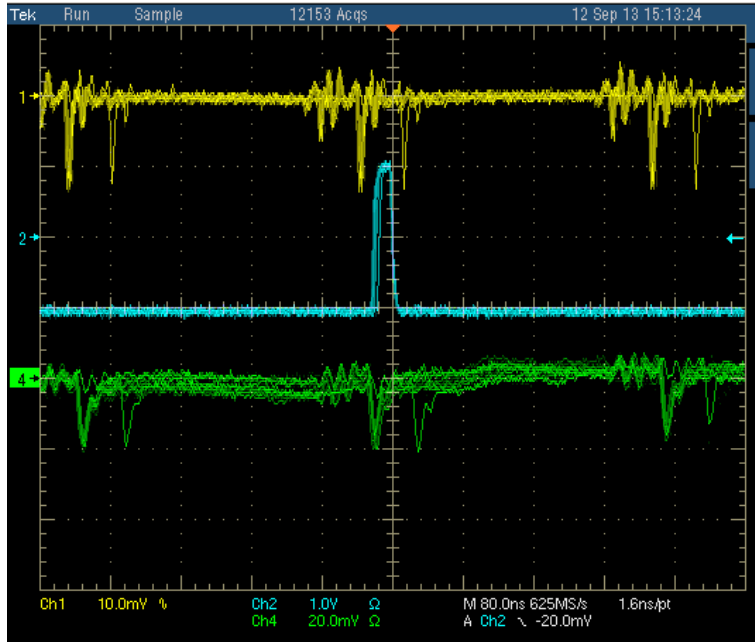
Threshold Setting 0.6V



Yello: Input from PMT+scintillator
Cyan: NINO discriminator out
Green: Amplifier out

Differential threshold
Threshold Setting = $V_{high} - V_{low}$

$$V_{low} = 1.25V$$



Yellow: Input from pulser
Cyan: NINO discriminator output
Green: Amplifier output

NINO is not firing on all signals
From pulser

Outlook

Electrical

Vary offset voltages to differential discriminator

Implement hysteresis control

Decouple 2.5V NINO supply from 2.5V amplifier bias

Mechanical

Produce EM shielding plate

Produce front clamp to hold input cables firmly