

GEM Detectors for the OLYMPUS Experiment

Progress Report

J. Diefenbach

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– Outline –

OLYMPUS

Gas Electron Multipliers

GEM Lab at Hampton

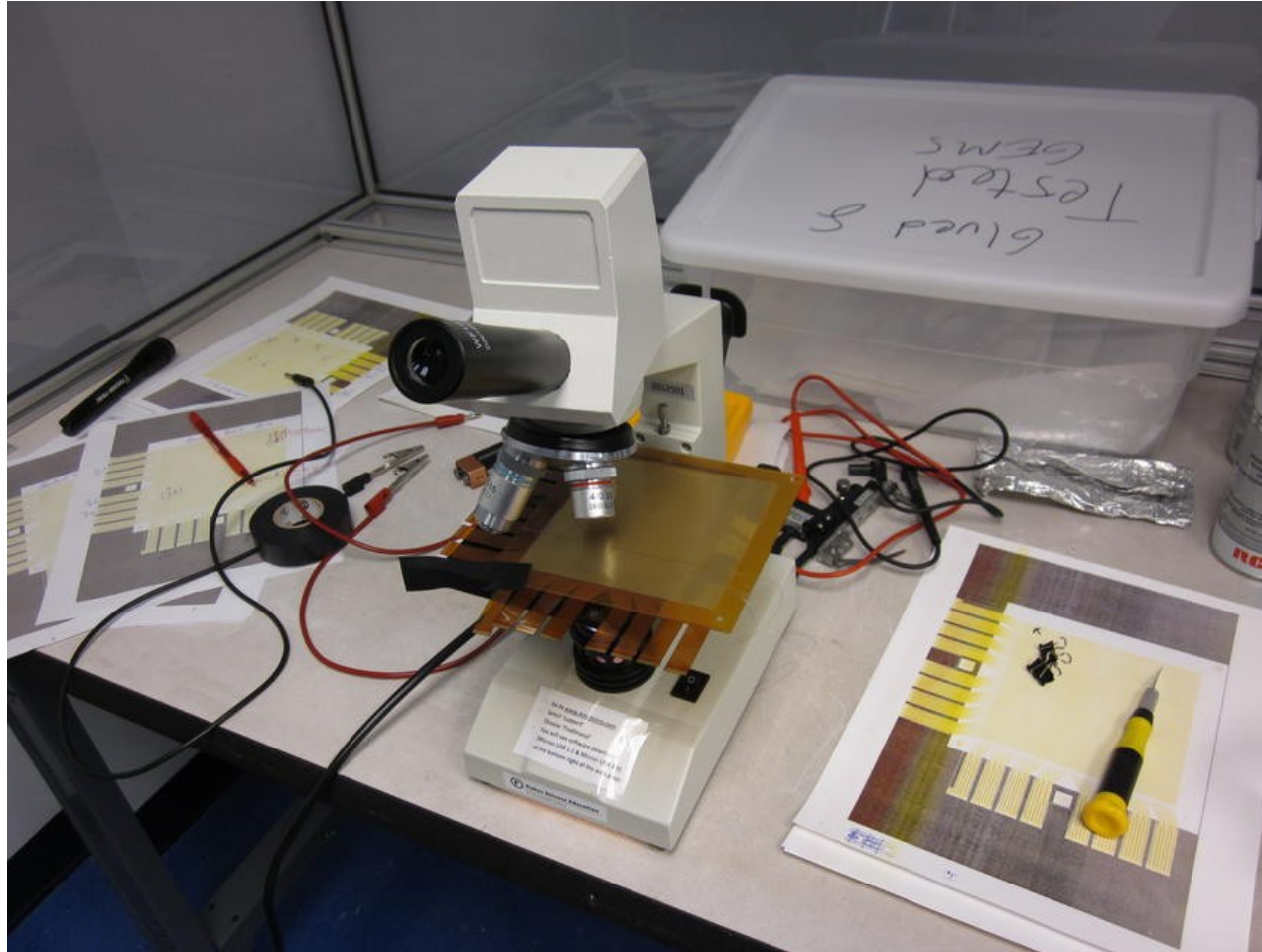
Testing GEM Stacks

First Signals

Finalizing the Detector Modules

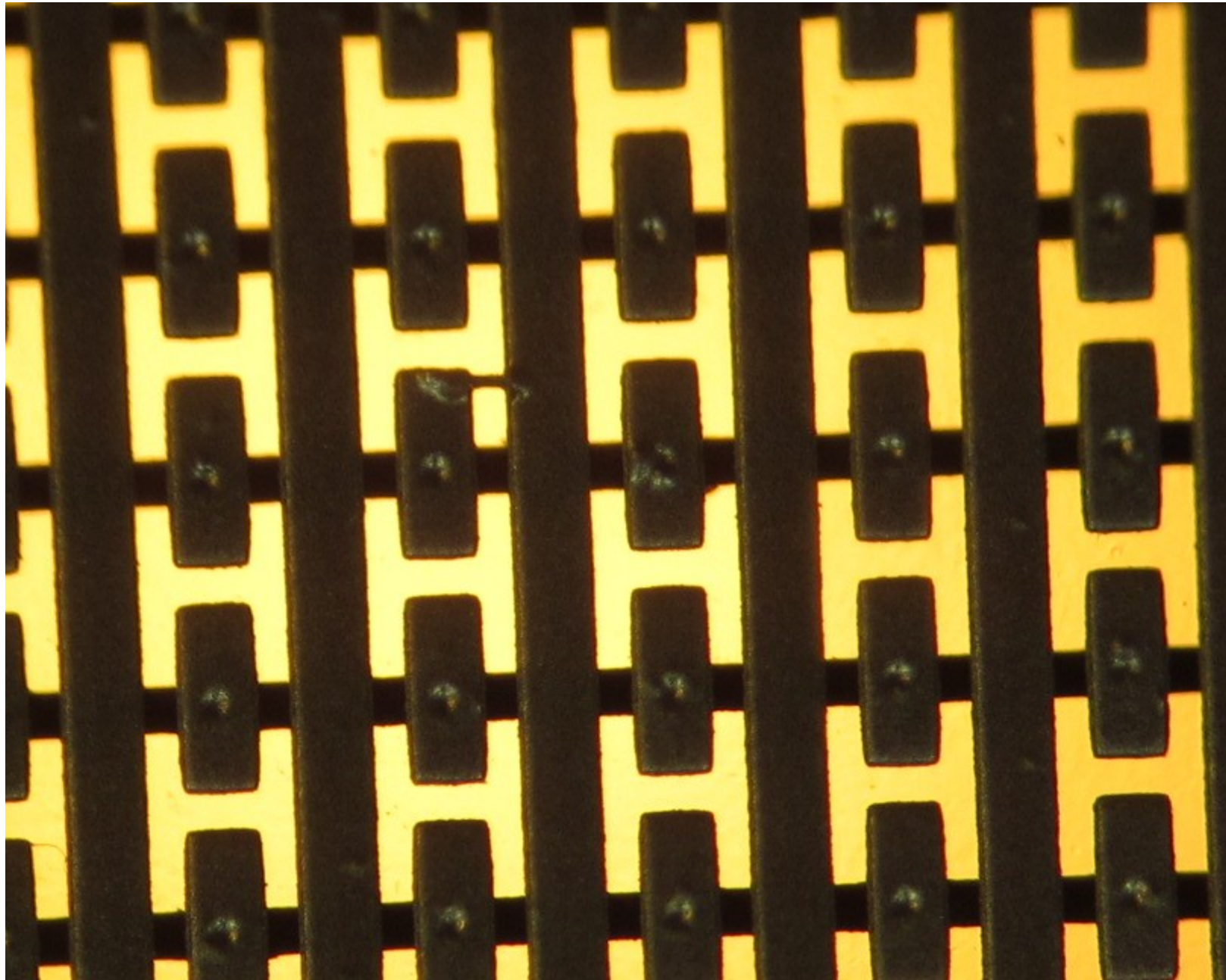
Readout System

Readout Boards – Shortcuts and how to Fix them...

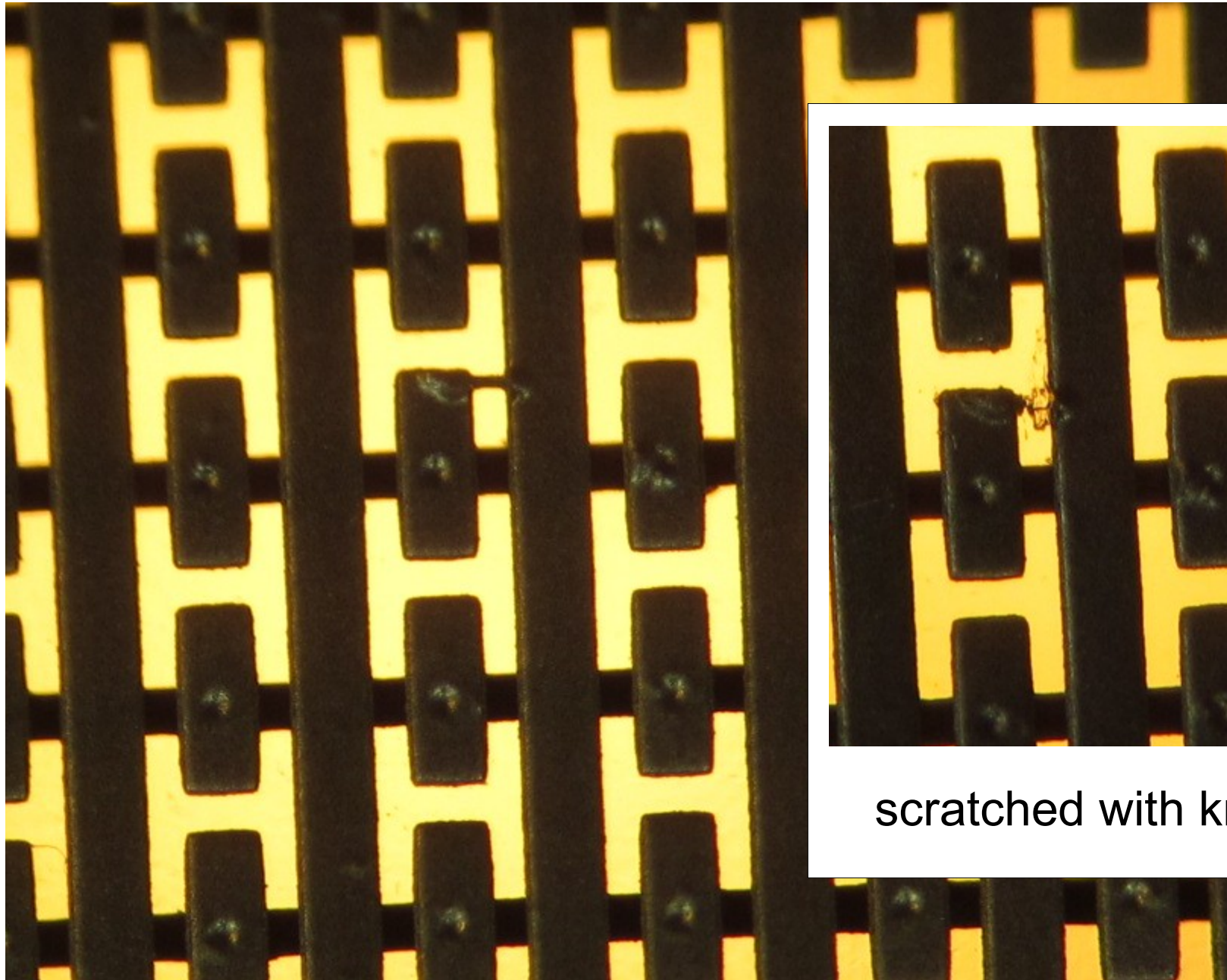


- Up to 5 shorts per board possible
- Checked all boards with Ohmmeter for shorts
- Found between 0 and 7 (8?) per board, typically ~3
- Verified under microscope and fixed them
- Currently 8 boards without any shorts

Readout Boards – Shortcuts and how to Fix them...

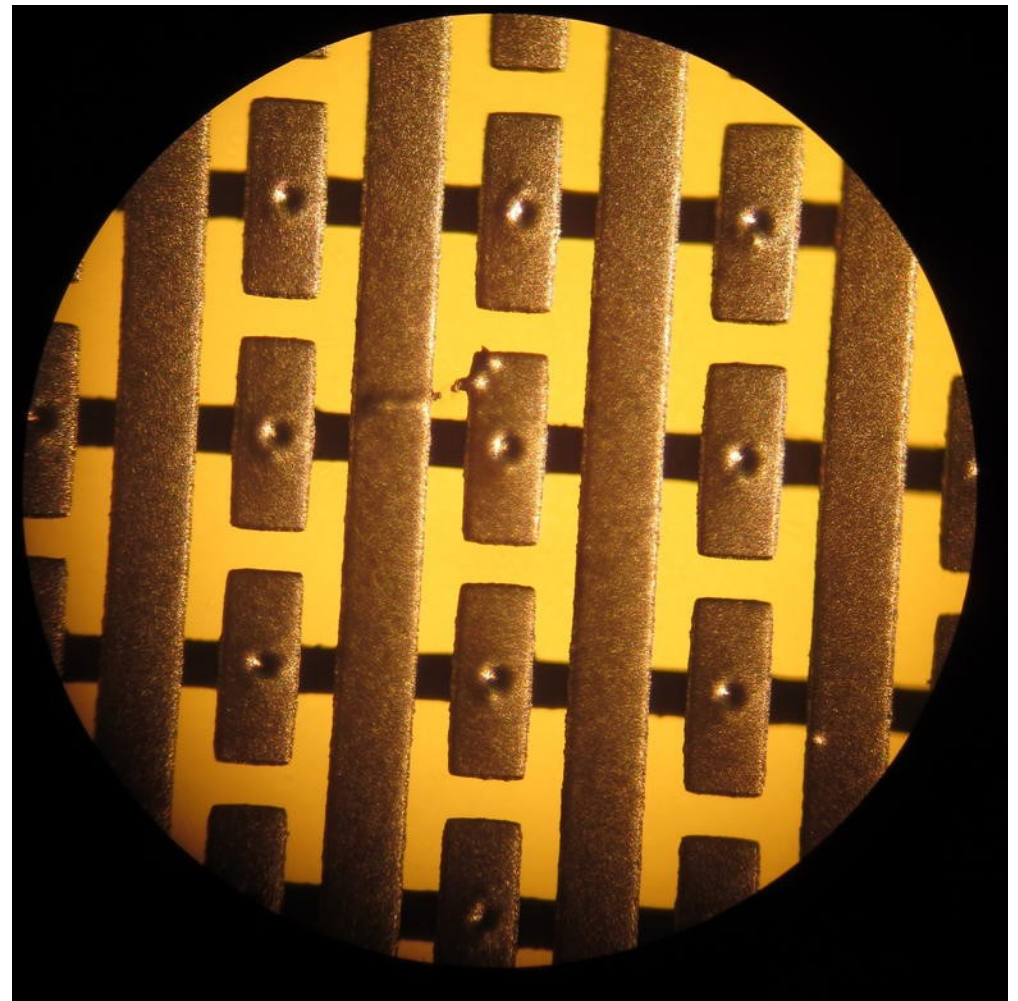
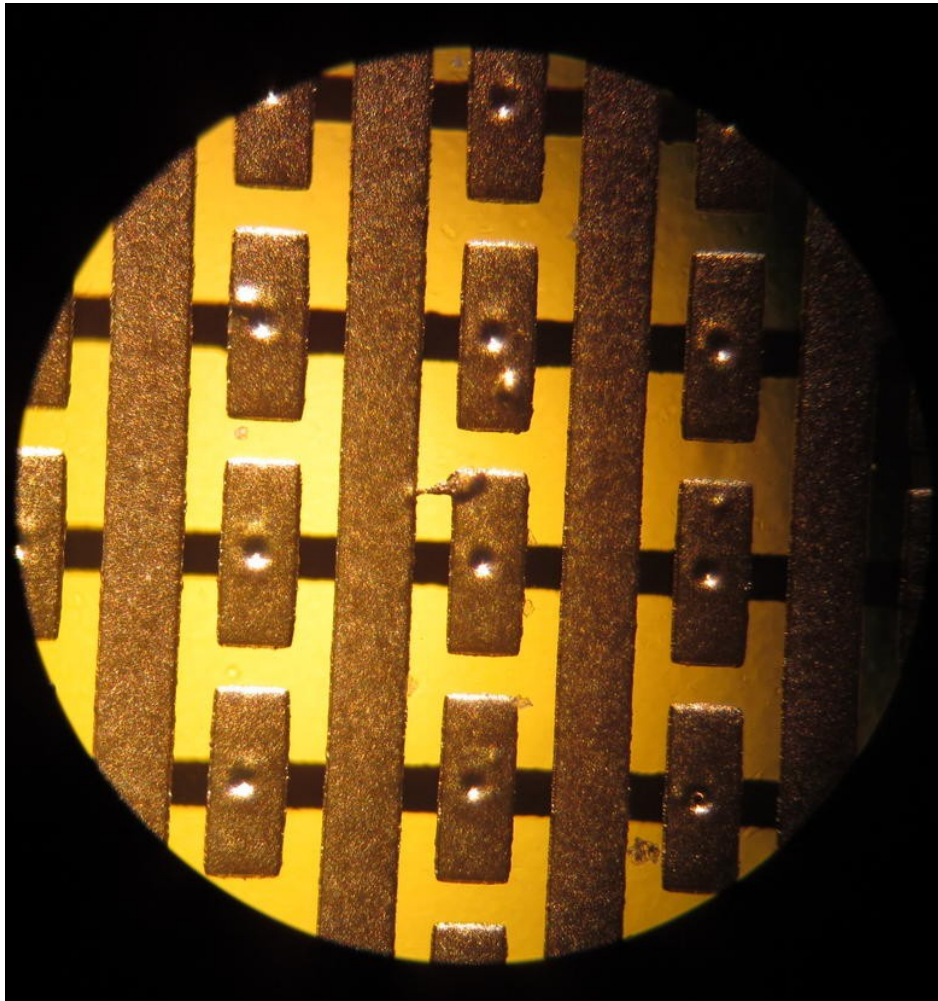


Readout Boards – Shortcuts and how to Fix them...



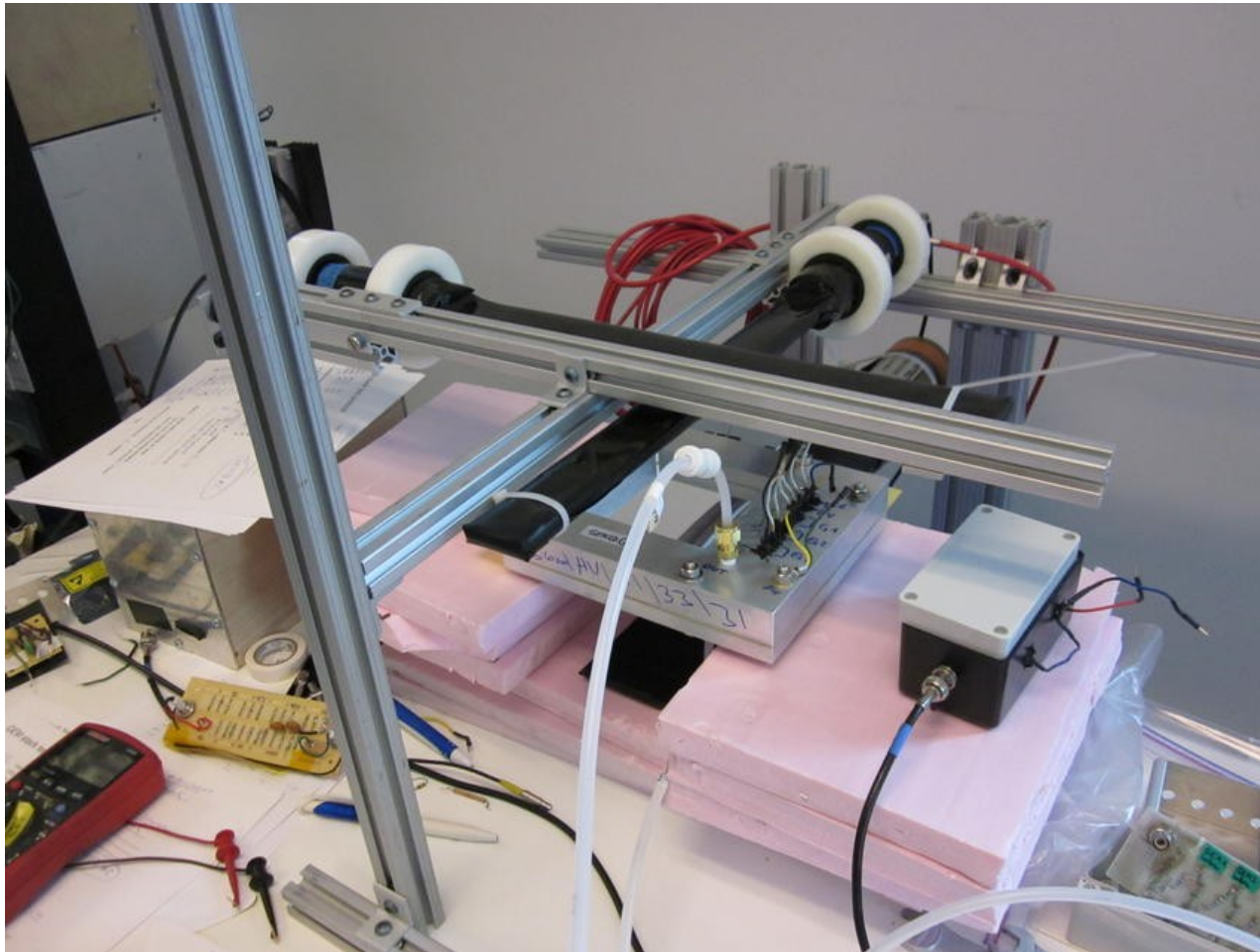
scratched with knife

Readout Boards – Shortcuts and how to Fix them...



blown with current from a 9V battery

Testing GEM Stacks

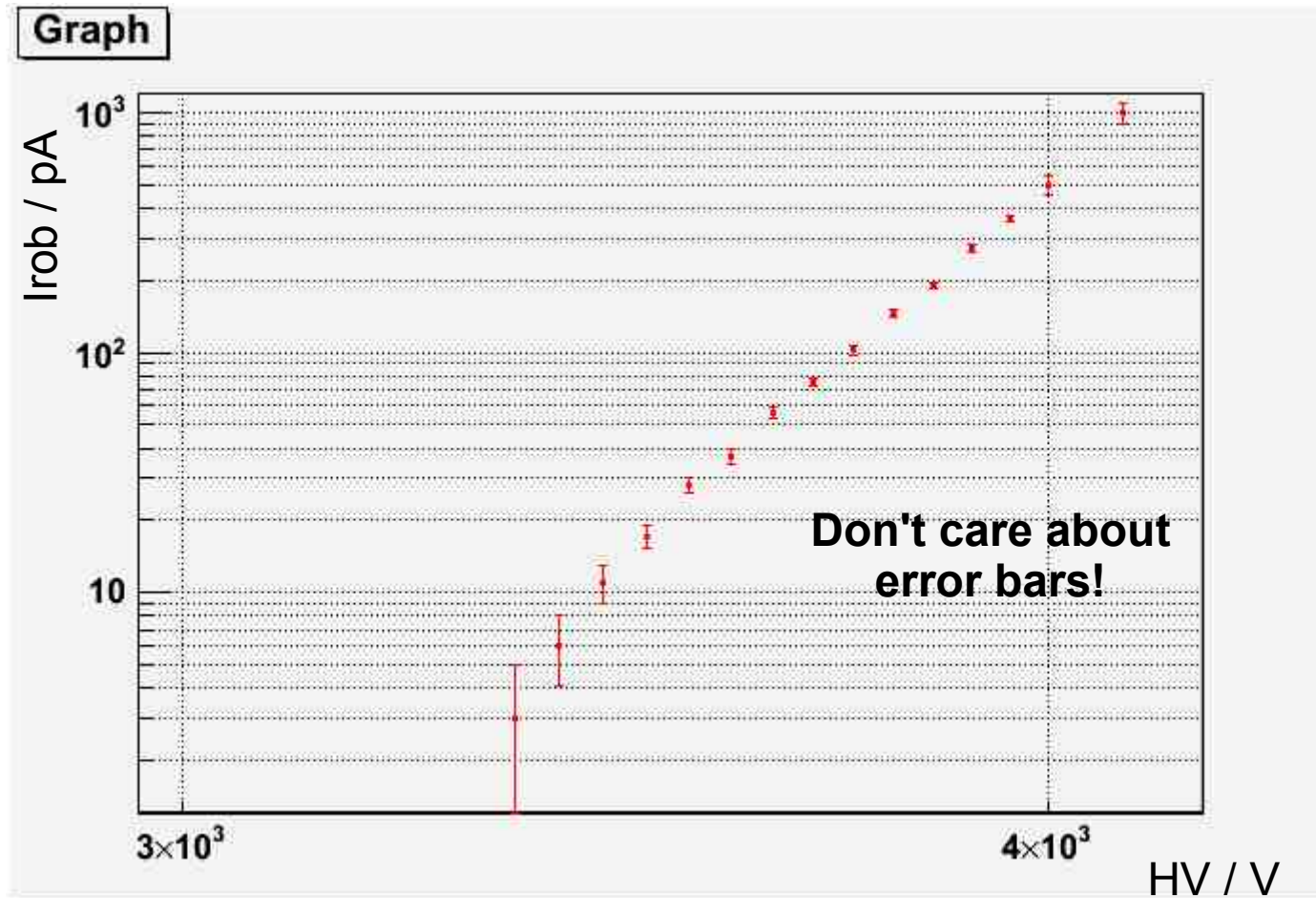


- Measurement of relative gains with sources
- Gain vs. Time and Gain vs. High Voltage
- DGEM relative gain (first two GEMs only)
- Cosmics Trigger (triple coincidence from plastics scintillators)

First Signals

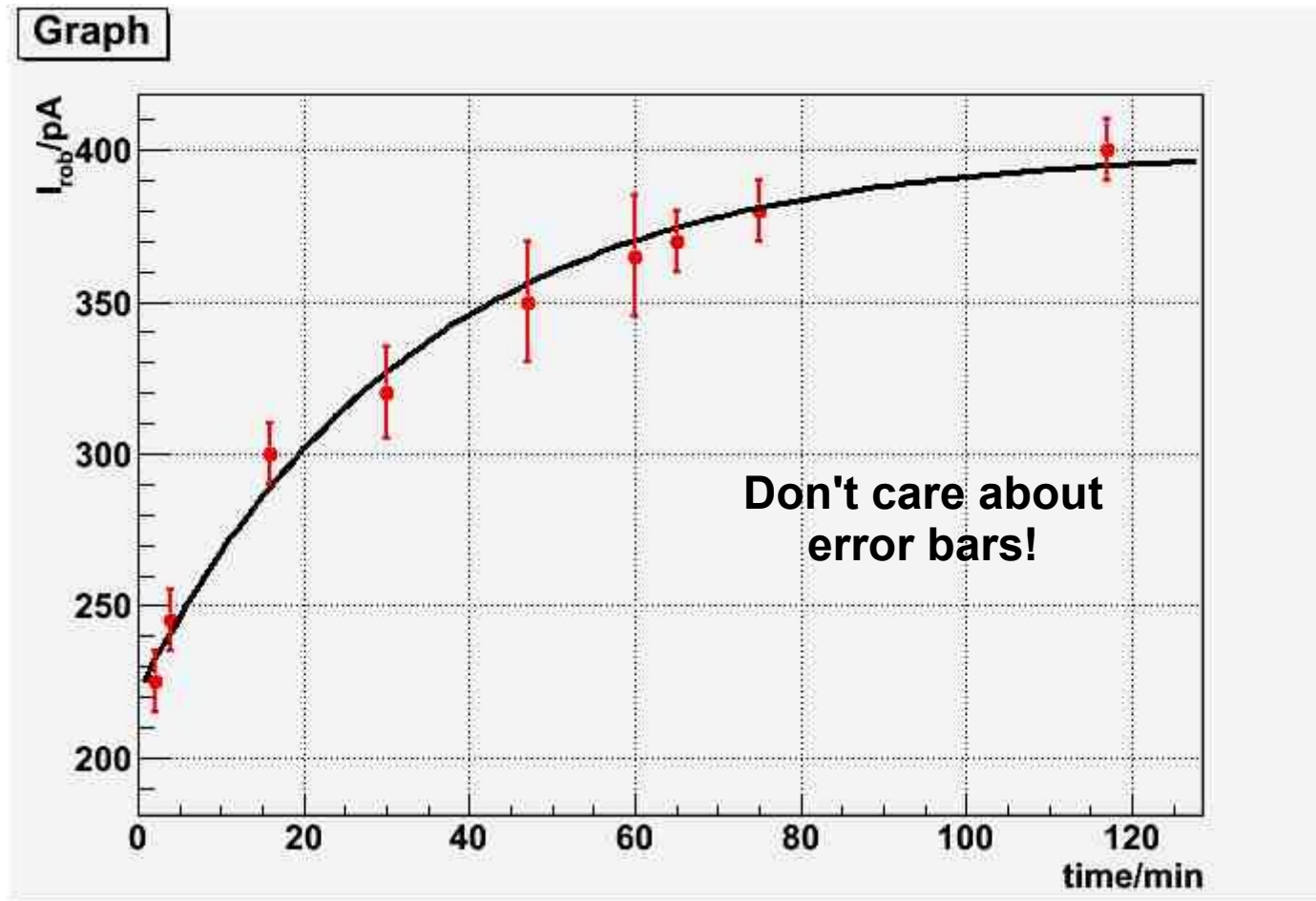
- (1) Tried to connect readout board to oscilloscope directly: didn't work...
- (2) Used amplifier (NIM module for PMT signals): didn't work either...
- (3) Used charge sensitive preamp made from parts found in the lab: worked! Terrible SNR, however...
- (4) Further optimized charge sensitive preamp: Nice SNR now (damping a parasitic LC oscillator)

First Signals



Relative gain (current from readout board in picoAmps) vs. HV

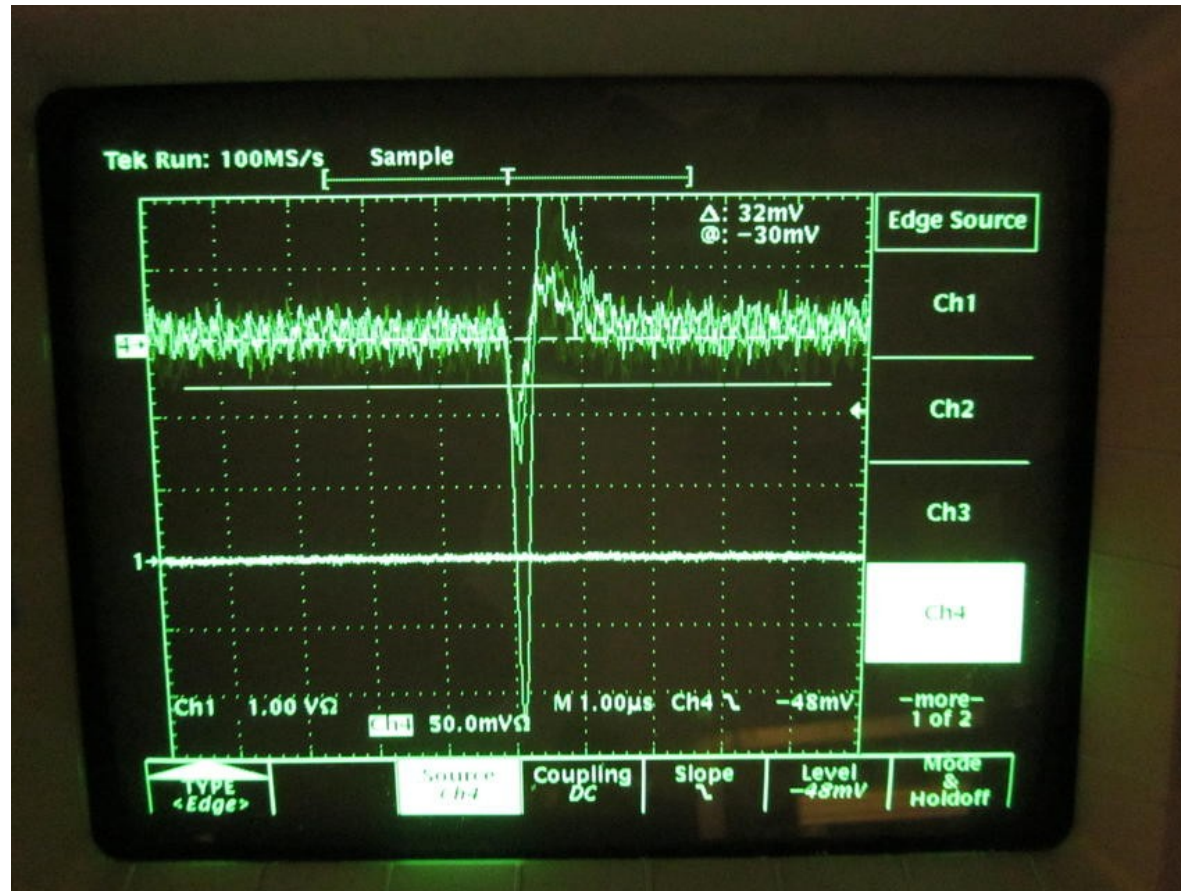
First Signals



Drift of gain (current from readout board in picoAmps) vs. time
Charge-up effect of dielectric (Kapton), $\tau \sim 35$ min.

$A \cdot \exp(1 - (t - t_0)/\tau)$ nicely fits data

First Signals



Capacitively coupling out signal from last GEM foil (@~1kV)
Charge sensitive Preamp, sensitivity ~1mV/8fC (hopefully!)