A Bench Top Silicon Imager

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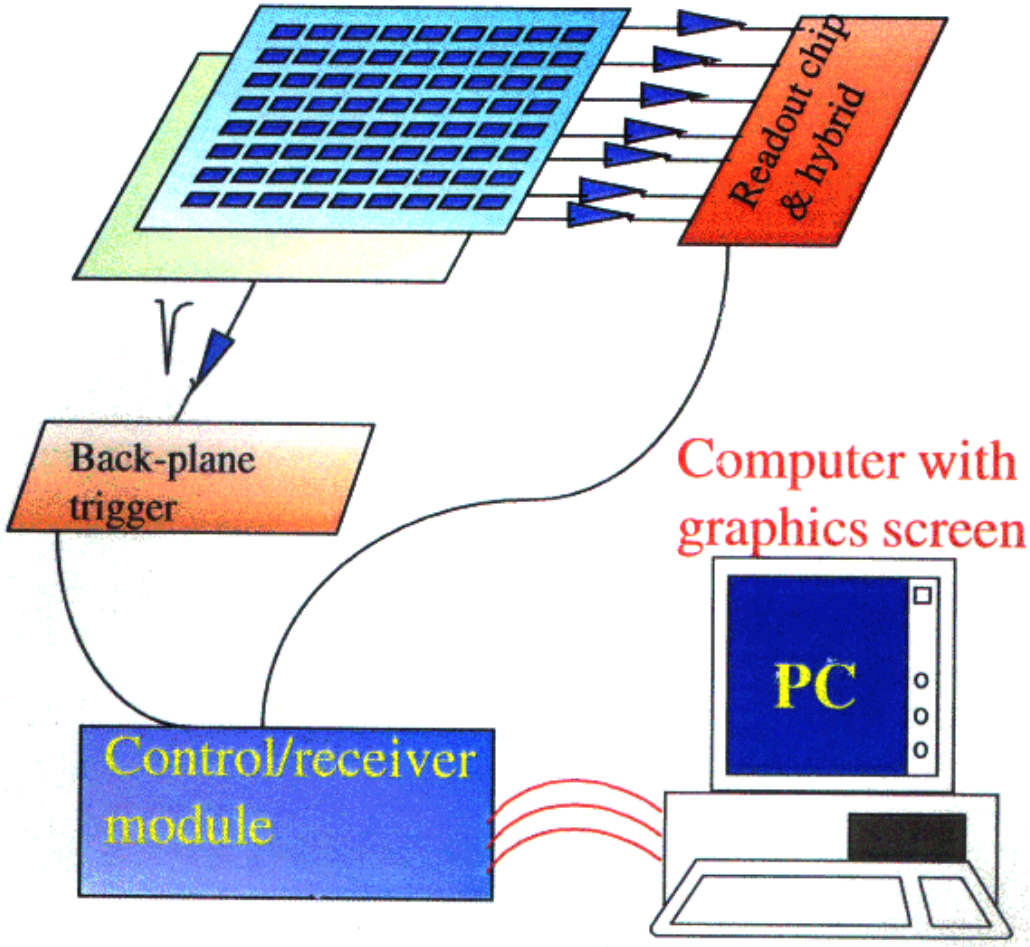
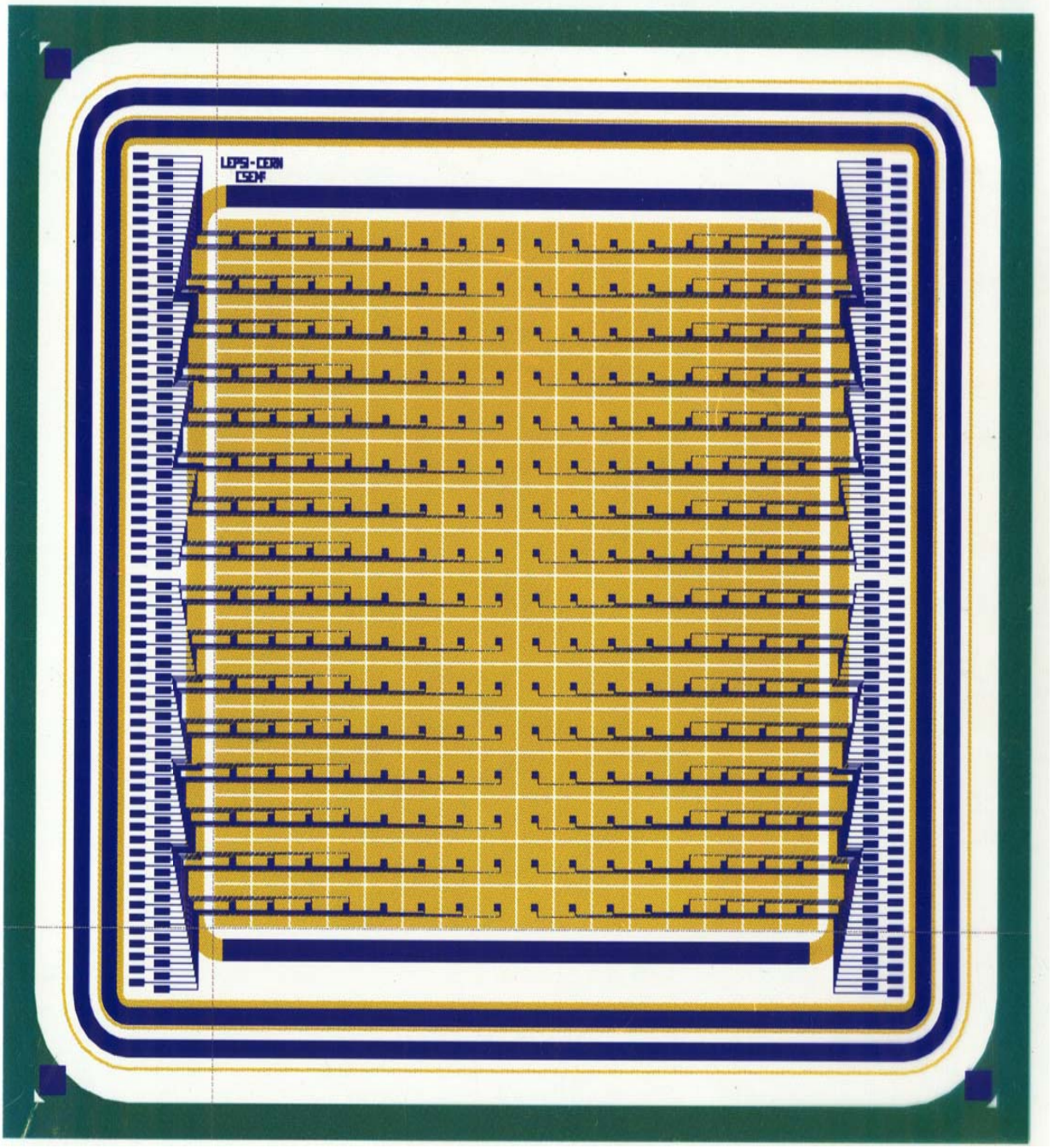
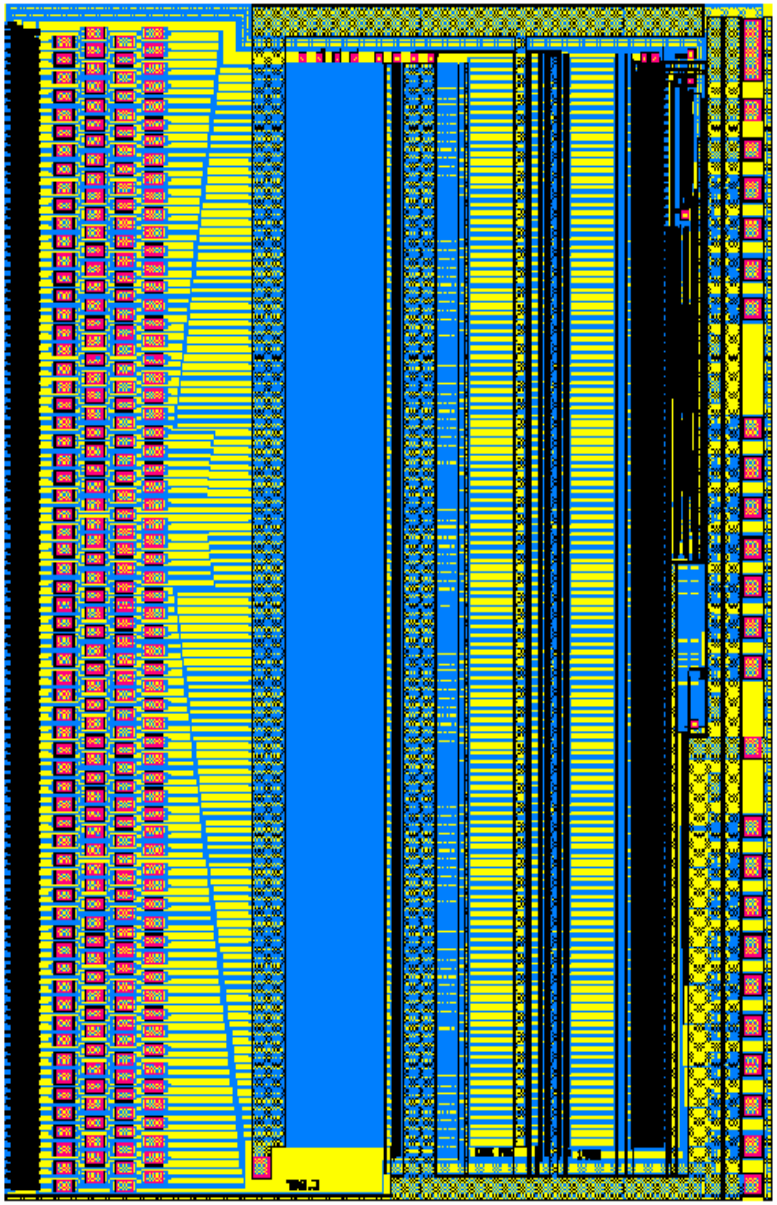
Pad detector with VA readout

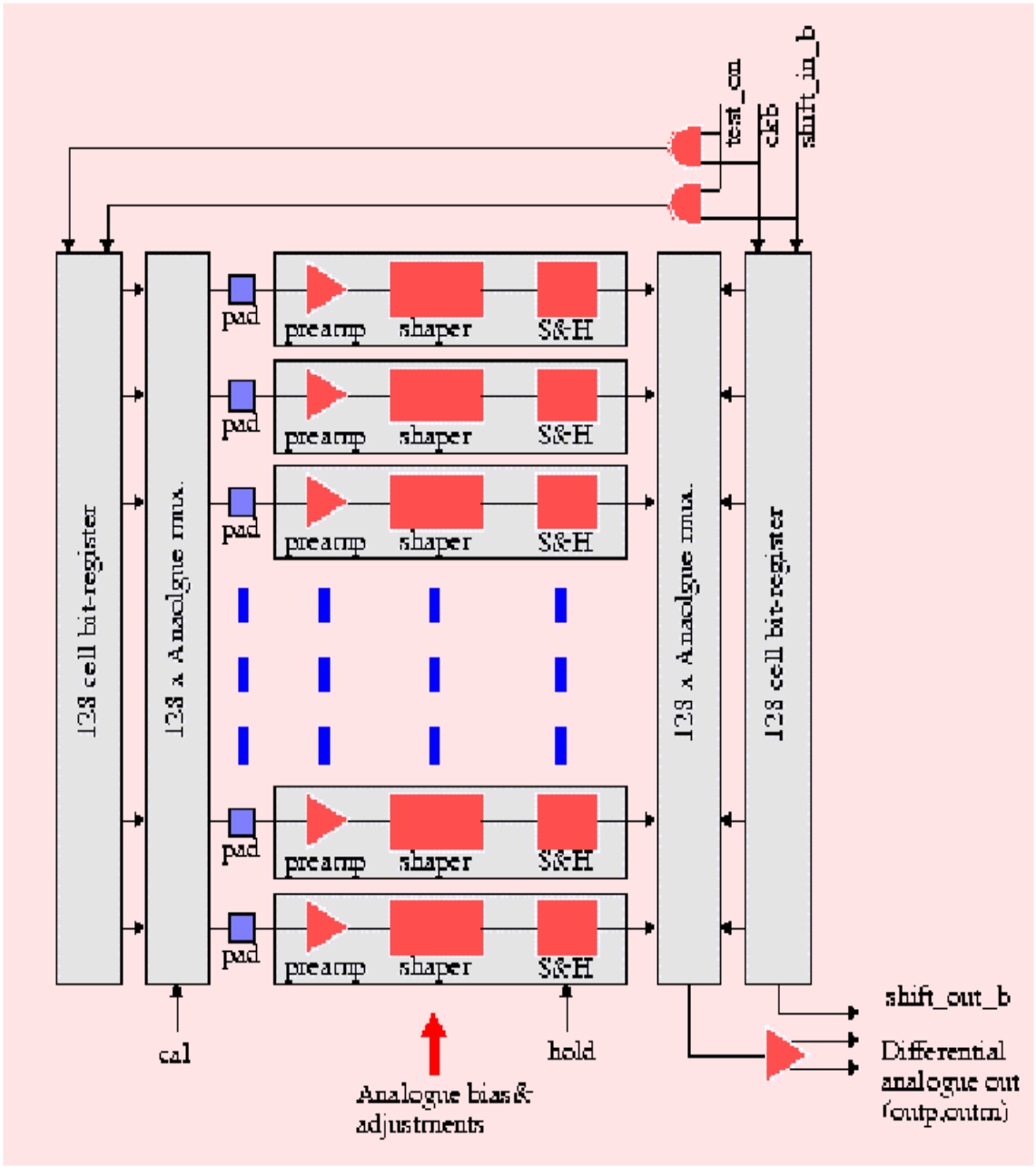
Single-sided silicon pad detector



- *Single photon/particle detection*
- *Position localization*
- *Energy measurement*


LEPS-CERN
CSEM


gnd
dvdd
dvss
delay_adjust
delay_on
holdb
hold (dummy
dreset
dresetb (dum
shift in b
ck (dummy)
ckb
shift out b
test on
avss
pre_bias
sha_bias
vref
ibuf
outm
outp
vfs
vfp
cal
avdd


test_cm
clkb
shift_in_b
128 cell bit-register
128 x Analogue mux.
pad
preamp
shaper
S&H
128 x Analogue mux.
128 cell bit-register
shift_out_b
Differential
analogue out
(outp,outm)
cal
Analogue bias&
adjustments
hold

Specifications

Sensor : Silicon Pixel detector, 5mm x 5mm x 300μm
256 Pixels (16 x 16)

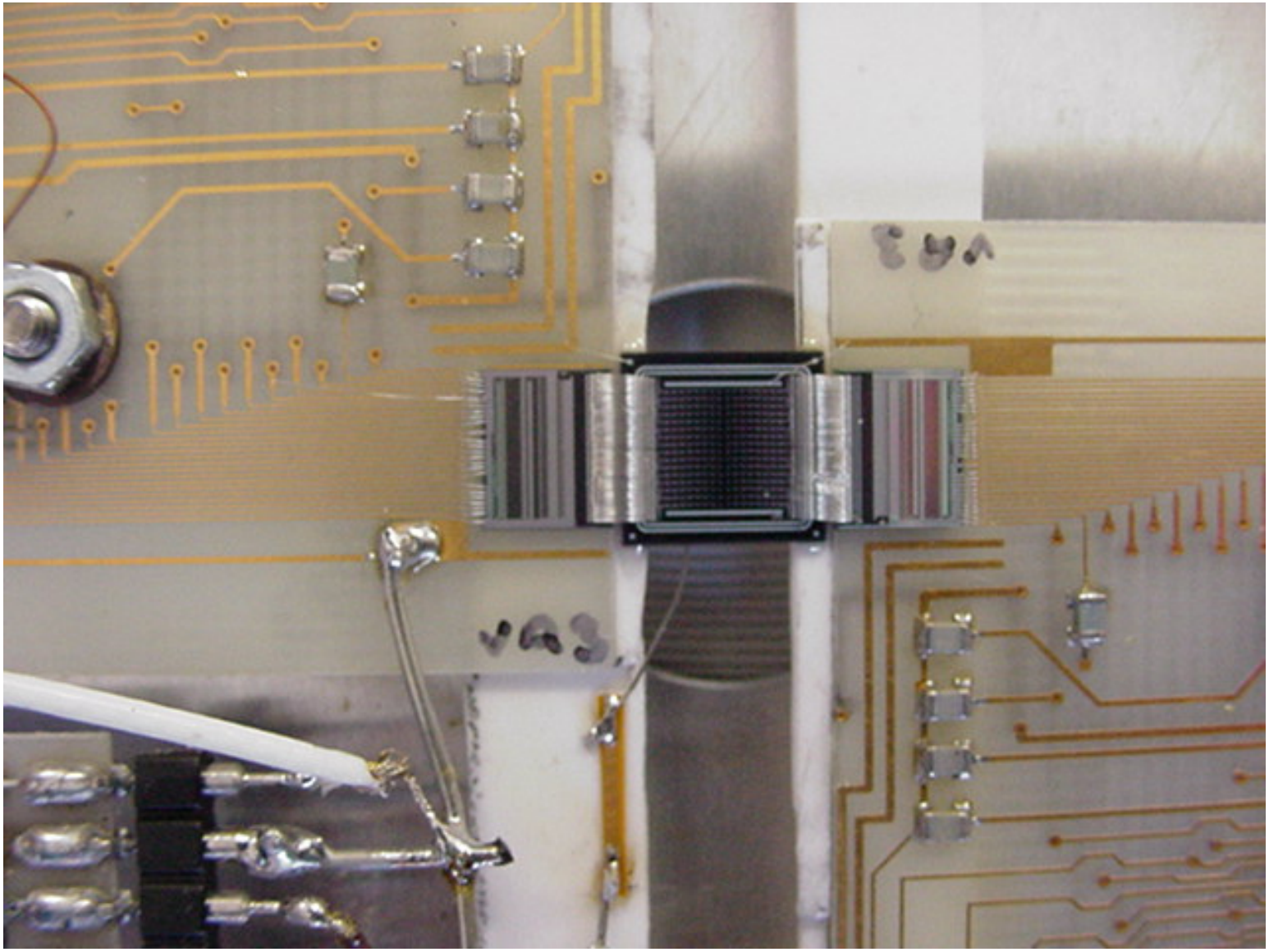
Trigger : Detector backplane

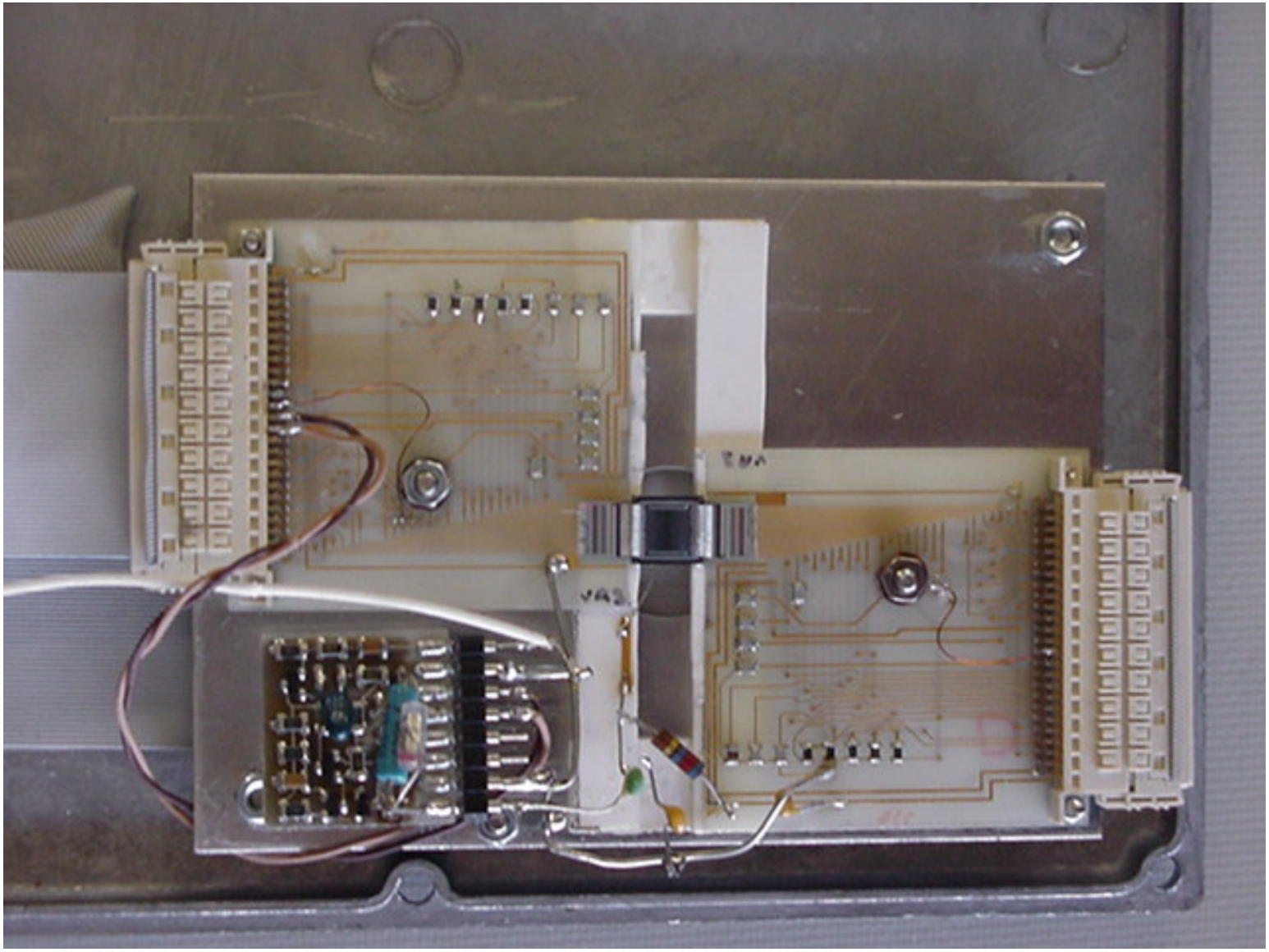
Amplifier : 2 x Viking VA3 (128 channels each) low noise charge sensitive preamplifier/CR-RC shaper

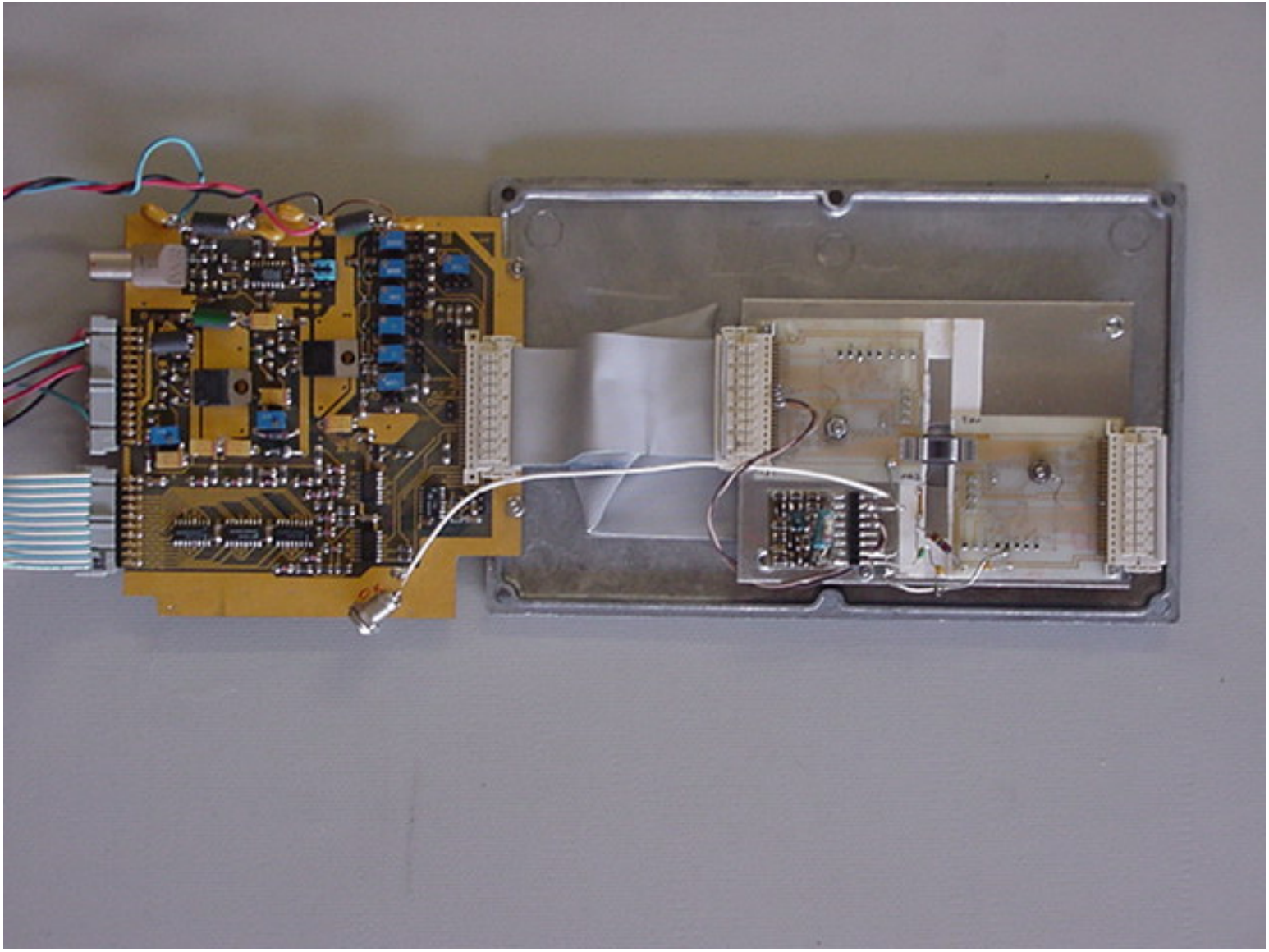
A to D : 12 bit, 3 msps successive approximation converter
AD7482 (only 8 bits used at present)

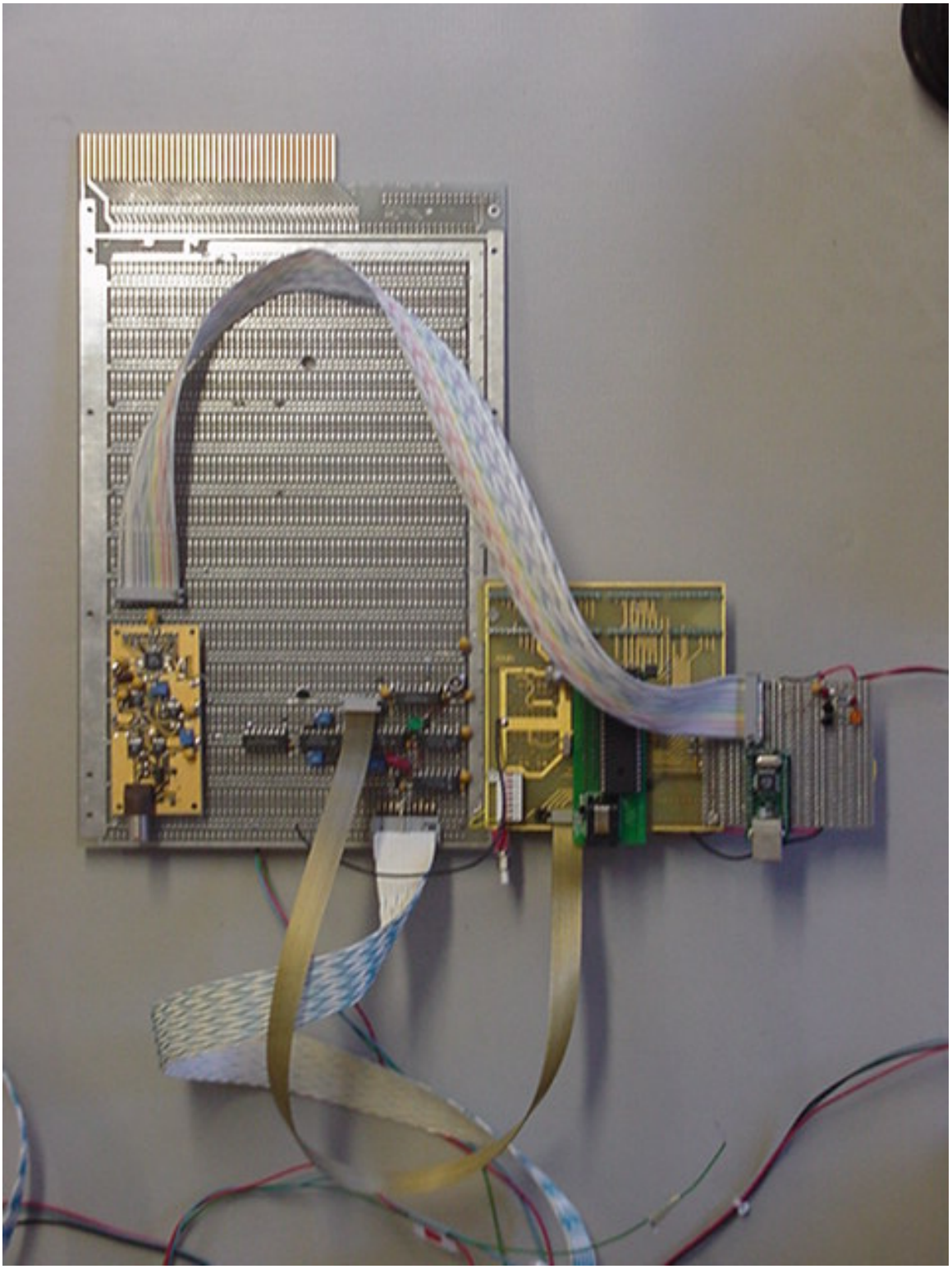
Control : PIC 16F877 microcontroller plus discrete logic

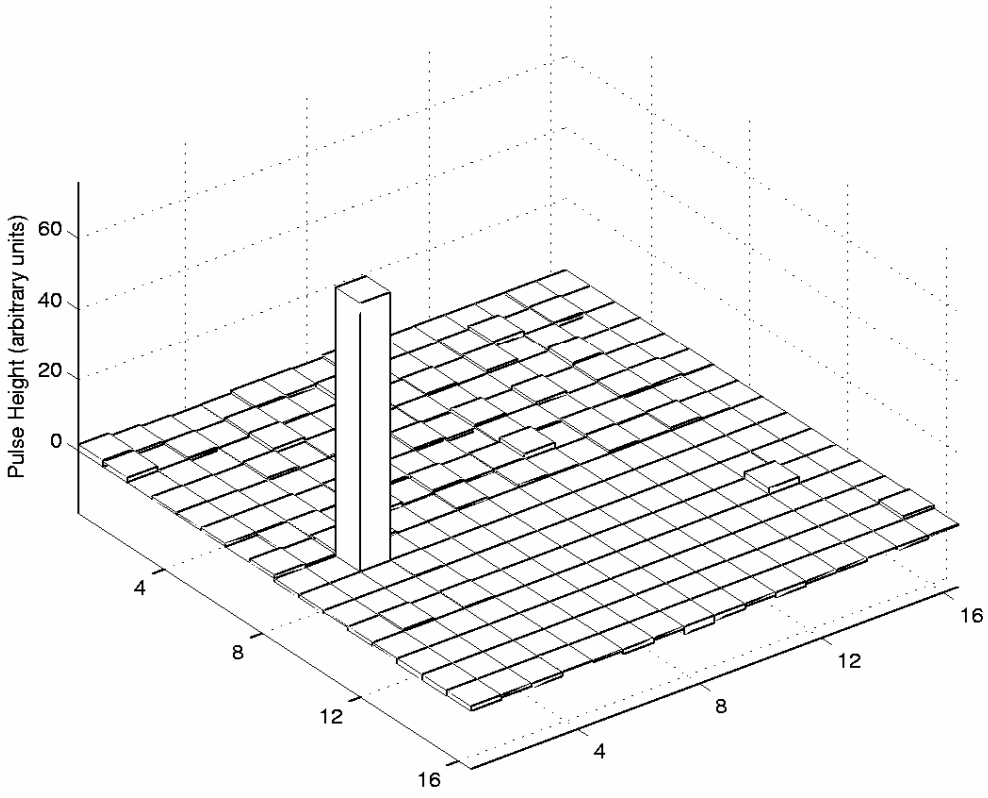
Readout : Future Technologies FT245m USB FIFO



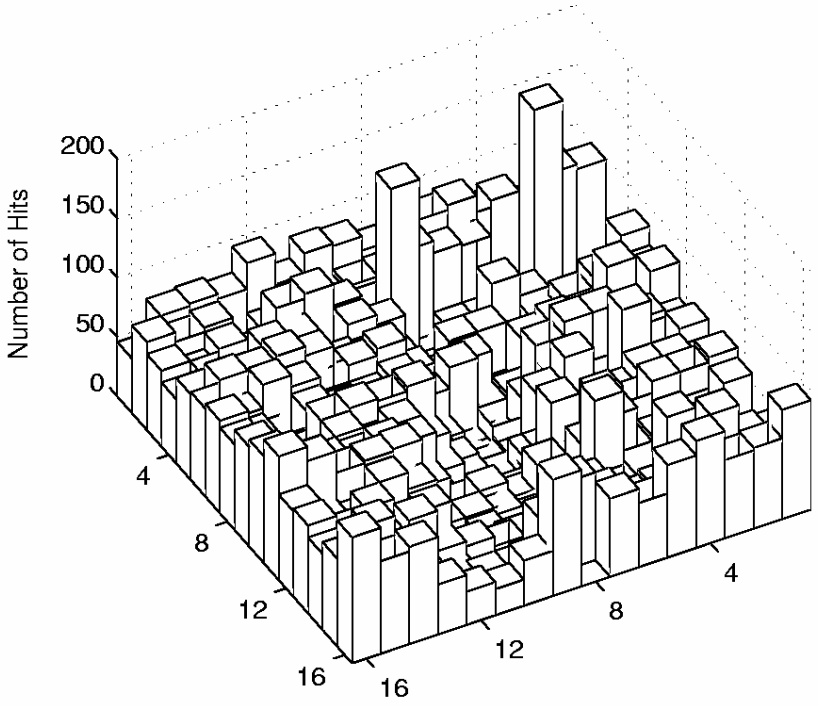




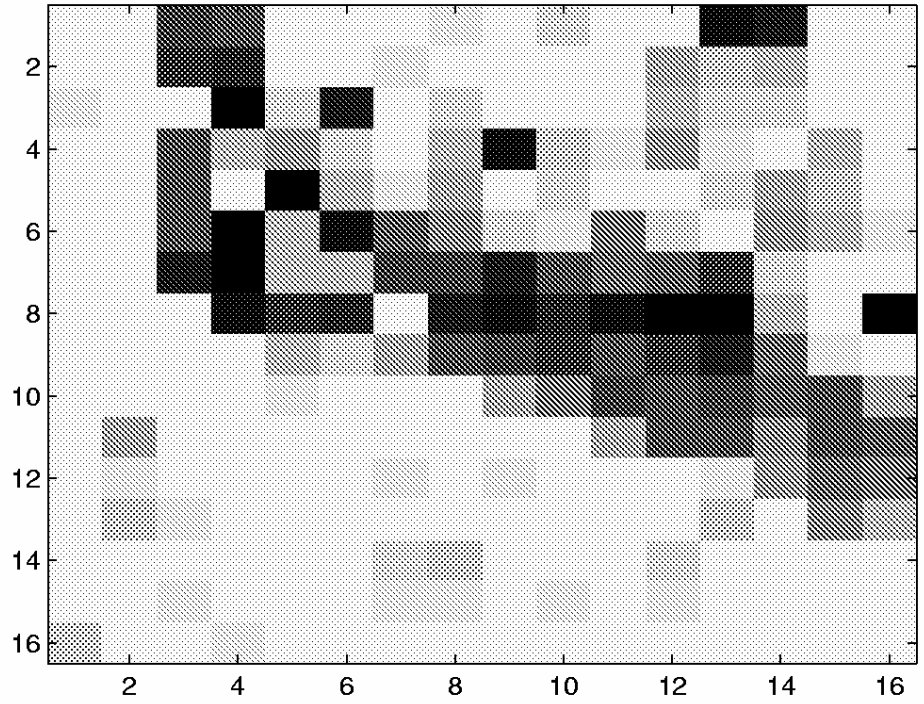




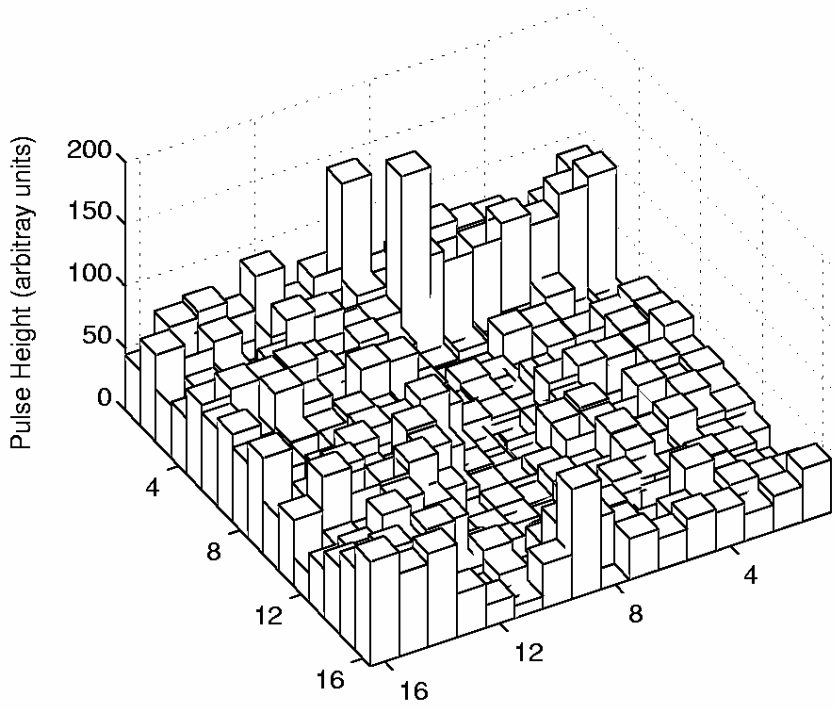
Single hit from 60 KeV Photon



Shadow cast by a length of solder (0.85mm diameter, 5K events)



Shadow cast by a length of solder (0.85mm diameter, 5K events)



Pulse height shadow cast by a length
of solder (0.85mm diameter, 5K events)

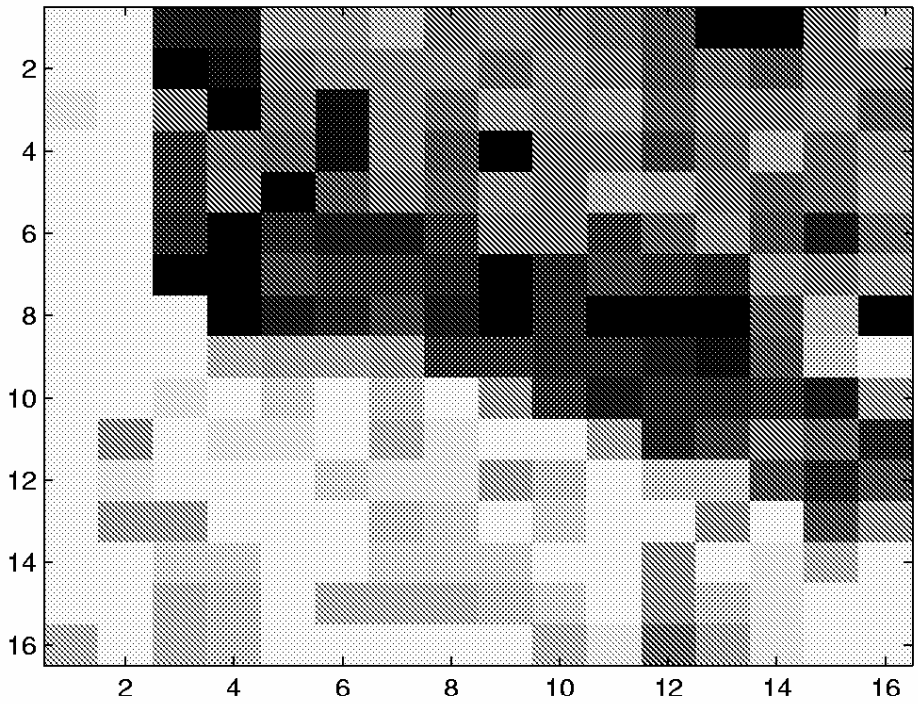


Image of pulse height shadow cast by a
length of solder (0.85mm diameter, 5K events)

Future Improvements

(i) Understand noise sources / trigger problems

(ii) Use all twelve bits of ADC

(iii) Replace discrete logic and external dead time gate circuitry with PIC code

(iv) Layout dedicated circuit board

(v) Scanning

Acknowledgements

Alan Rudge