National Research FLAGSHIPS CSIRO

CENTRE FOR QUANTUM COMPUTATION & COMMUNICATION TECHNOLOGY
AUSTRALIAN RESEARCH COUNCIL CENTRE OF EXCELLENCE

THE UNIVERSITY OF MELBOURNE

REPORT ON (STAGE 2) UPGRADE OF THE 5U PELLETRON

THE C.S.I.R.O GEO PIXE MICROPROBE BEAM LINE

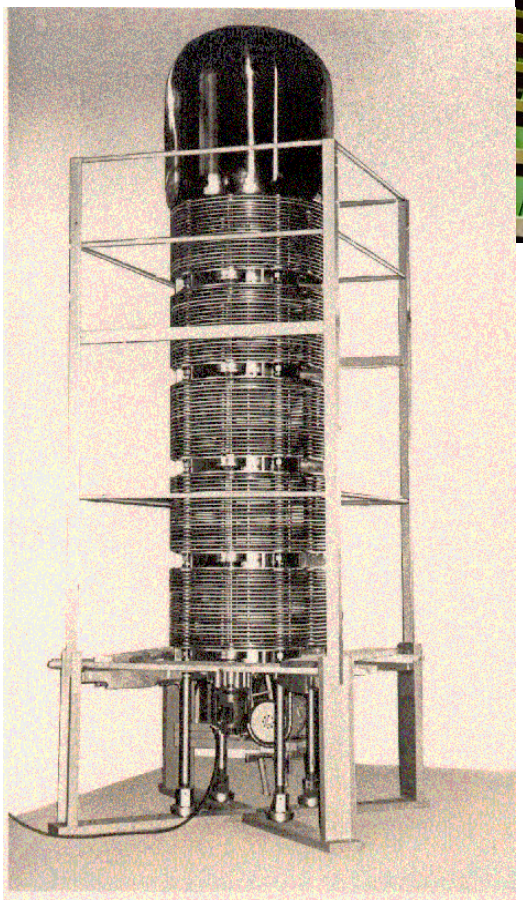
Under the **EIF** and **CRIS /NUCRIS** funding program.

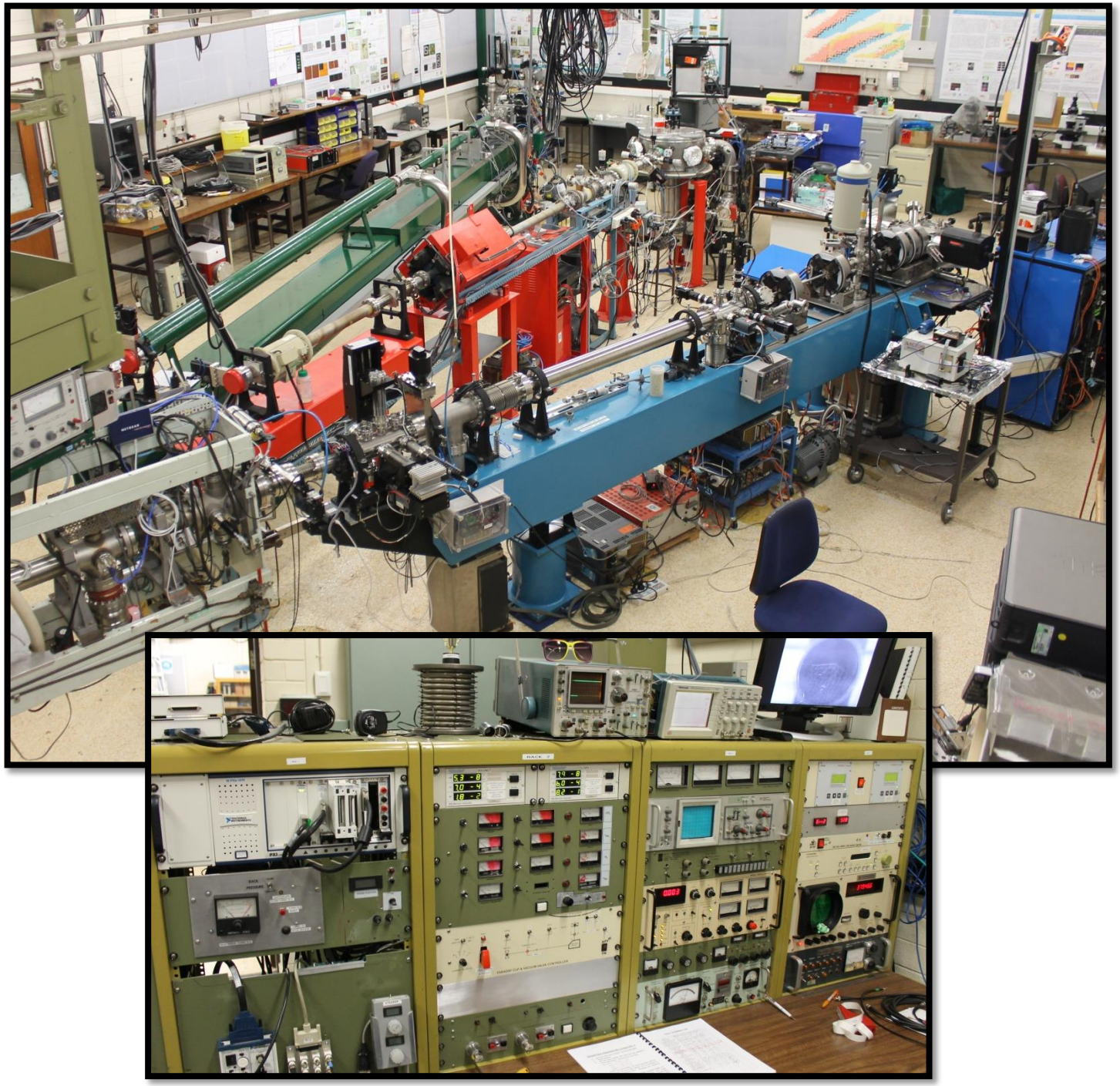
1975. National Electrostatic 5U Pelletron

5 Mev single ended accelerator

rf ion source

Single charging chain





PELLETRON UPGRADE

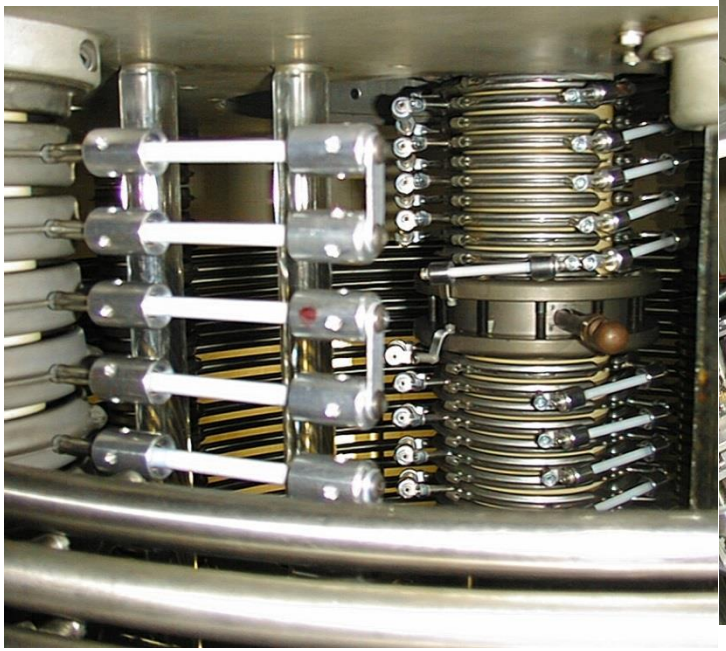
1ST UPGRADE SINCE 1975 INSTALLATION

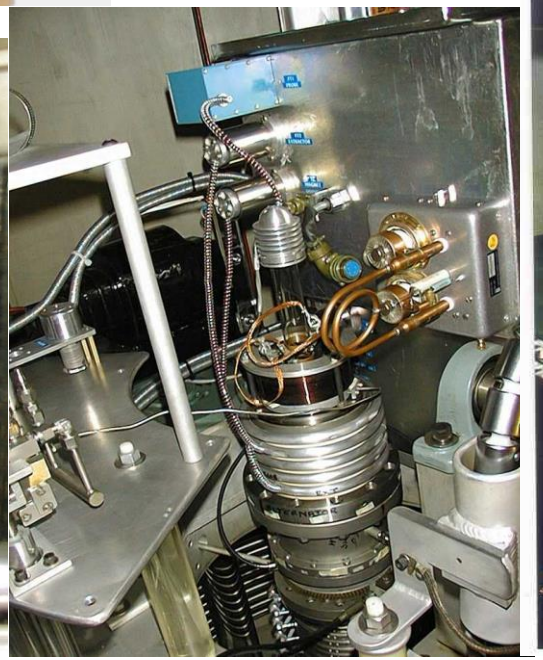
FUNDED BY ARC 2002

New charging chain

SF6 compressor

Analysing magnet power supply





PRESENT ONGOING UPGRADE

COMPUTER CONTROL

NATIONAL INSTRUMENTS PXI
VI-- LABVIEW ???

TERMINAL TELEMETRY

GROUP3 , Loop controller

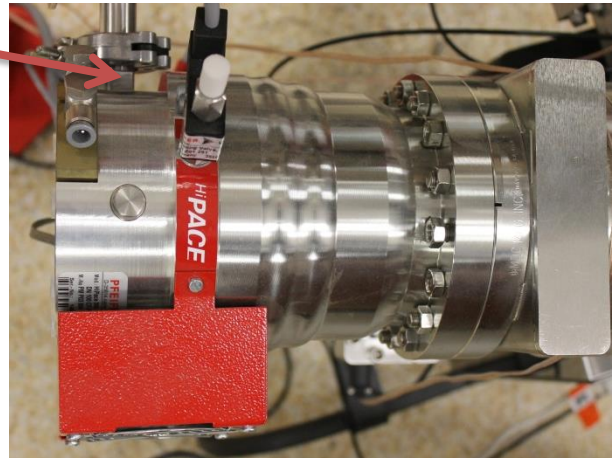
2 x I/O control boards

2 x device interfaces

PELLETRON, TARGET CHAMBER VACUUM SYSTEM

WHY 15 KF?

HIPACE 300 TURBO PUMPS.

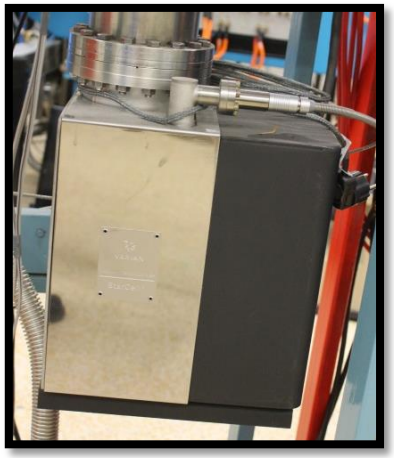


TCP 350 PUMP CONTROLLERS

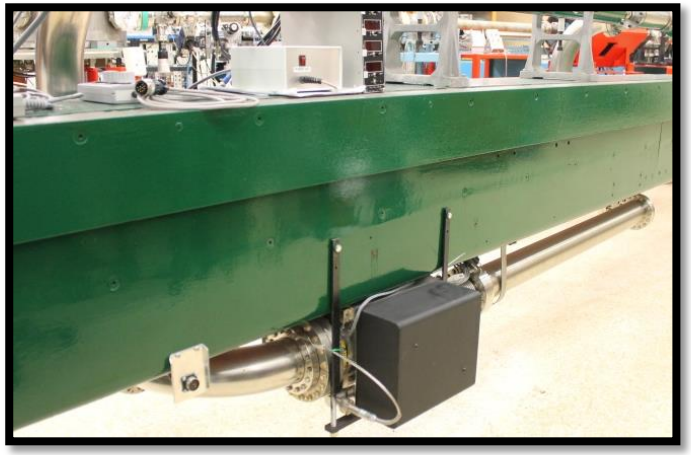
ANESTA IWATA 250 SCROLL PUMPS

BEAM LINE VACUUM SYSTEM

TARGET CHAMBERS



VARIAN 150 + 350
STAR CELL ION PUMPS



VARIAN DUAL ION PUMP
CONTROLLER

VACUUM MEASUREMENT

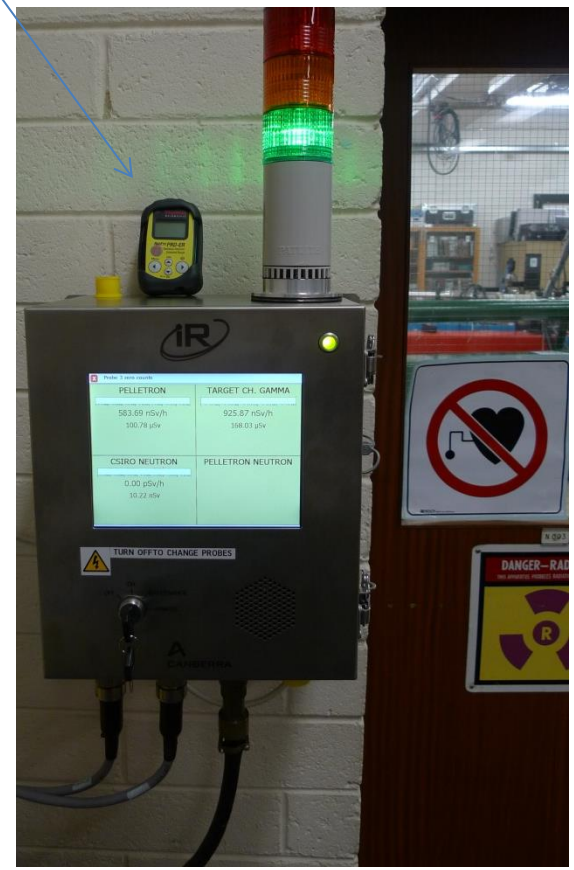
PFEIFFER DUAL & SINGLE
262 GAUGES

ACCELERATOR -- GRANVILLE PHILLIPS

2x TARGET CHAMBER & BEAM LINE
CONTROL PANELS

RADIATION DETECTION AND MONITORING SYSTEM

THERMO SCIENTIFIC RADEYE



CANBERRA INSTRUMENTS iR 7040

NEUTRON DETECTOR
0.025 ev – 15MeV
0 – 100 mSv/h

GP100C25 GAMMA DETECTOR
0.1 - 100 uSv/h

OTHER PURCHASES

2 x 50 Kv 1.5MA Glassman power supplies- chg/chn

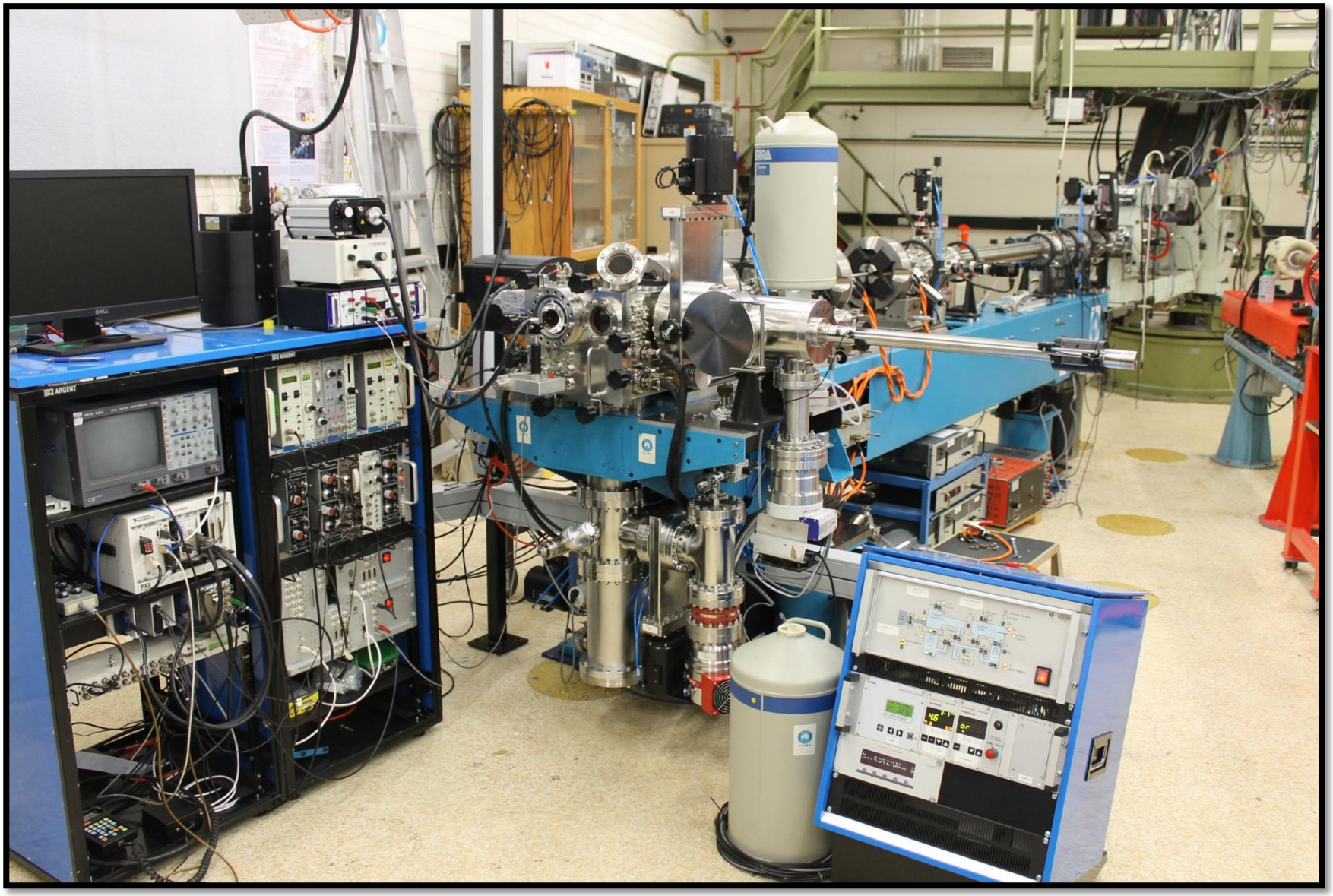
4 x 90 amp Kepco p/s for microprobe lenses.

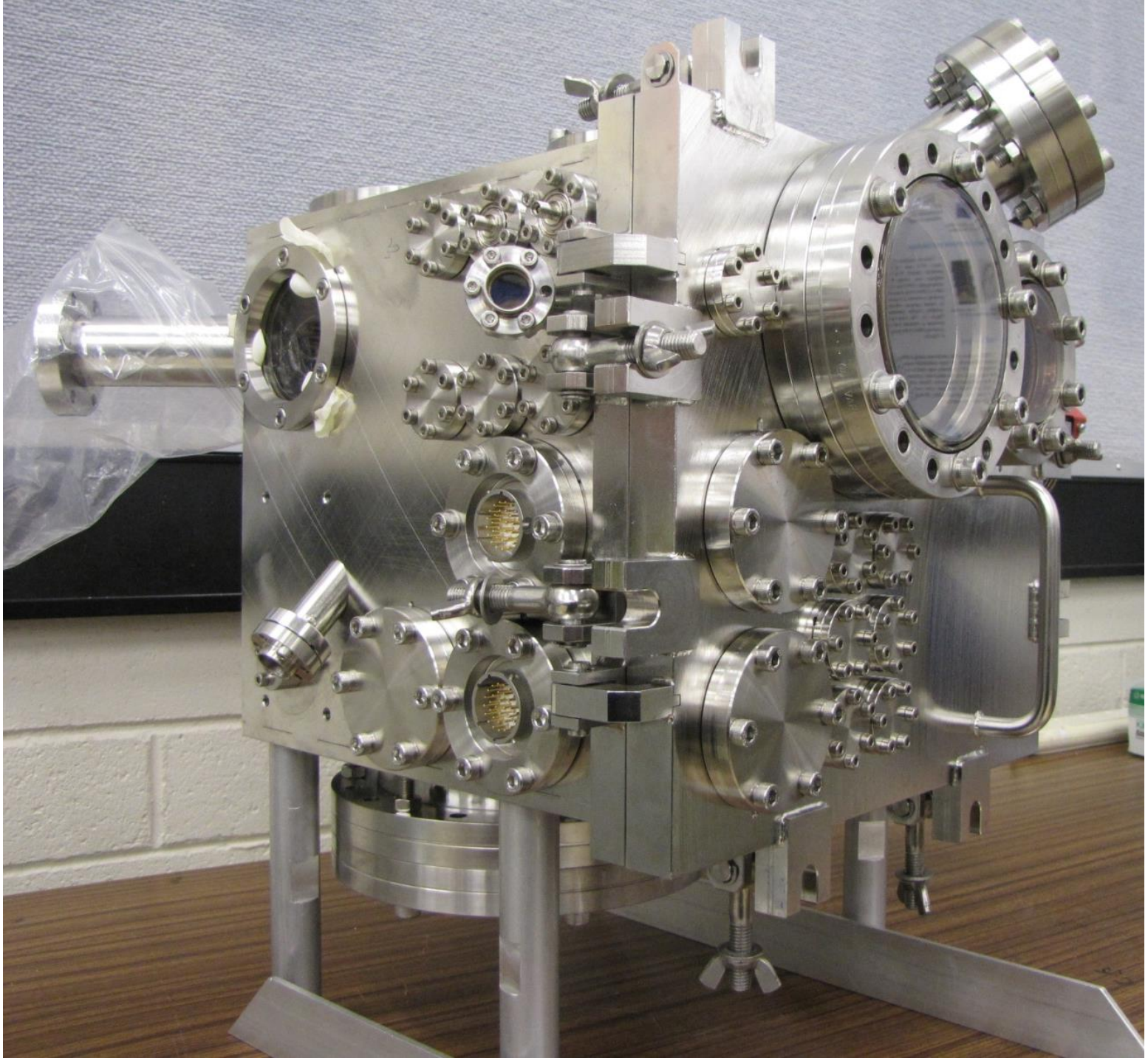
3 x New beam profile monitors.

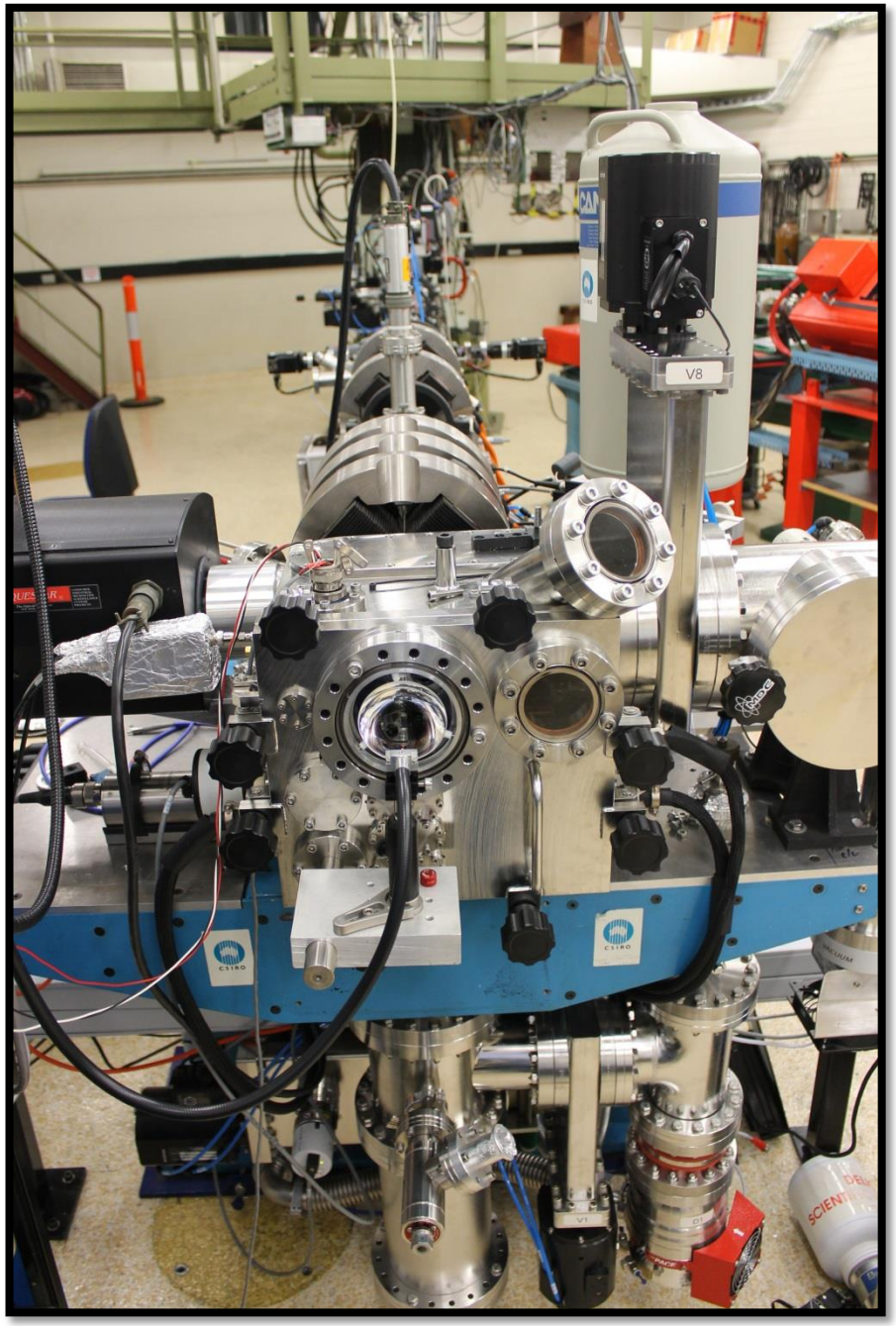
1 x X/Y Fischer slit for MP2

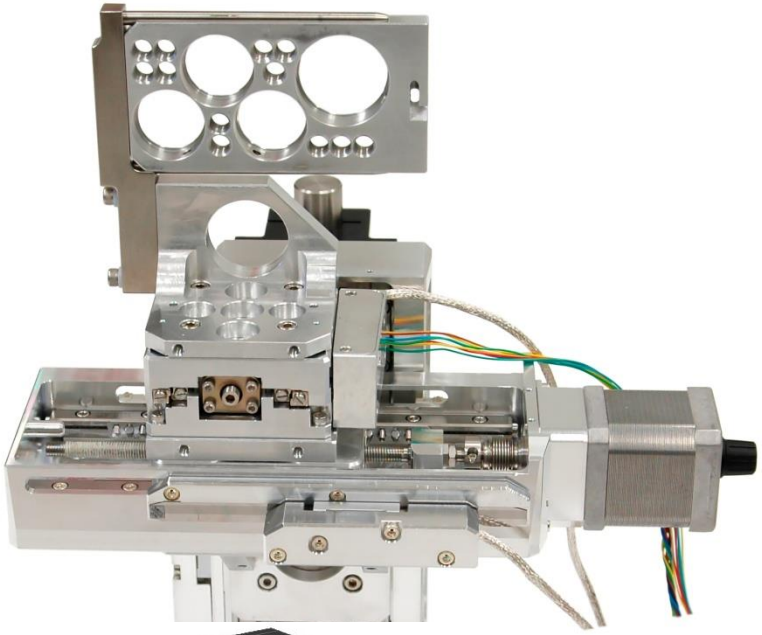
1 x Charging Chain. Pickup and idler wheels.

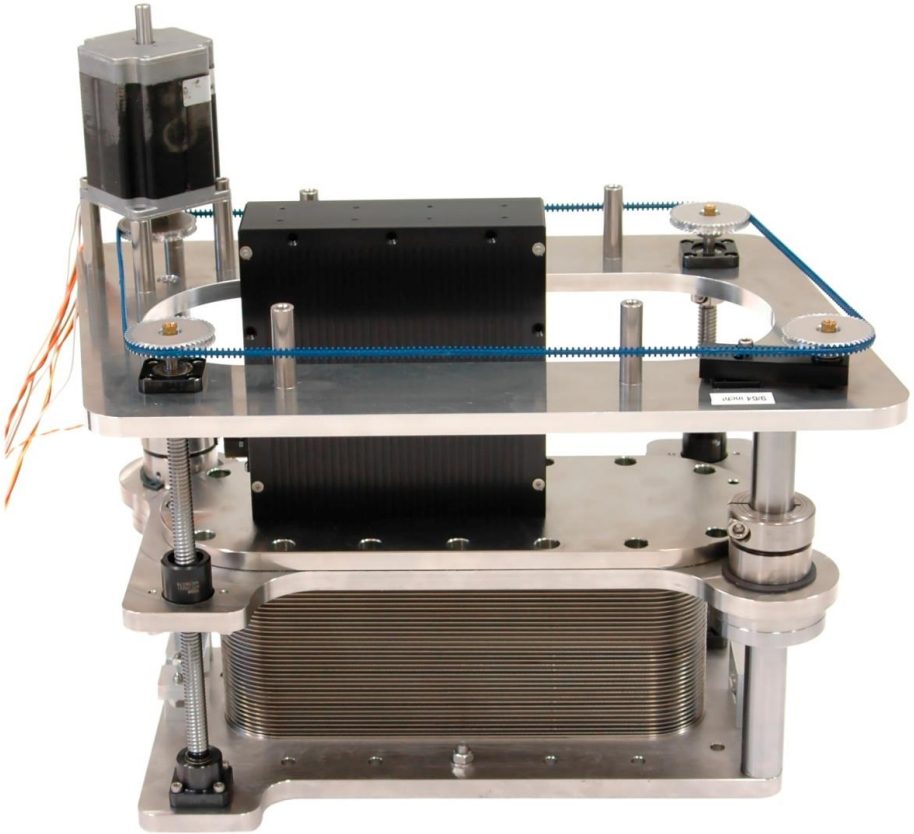
C S I R O GEO-PIXE MICROPROBE

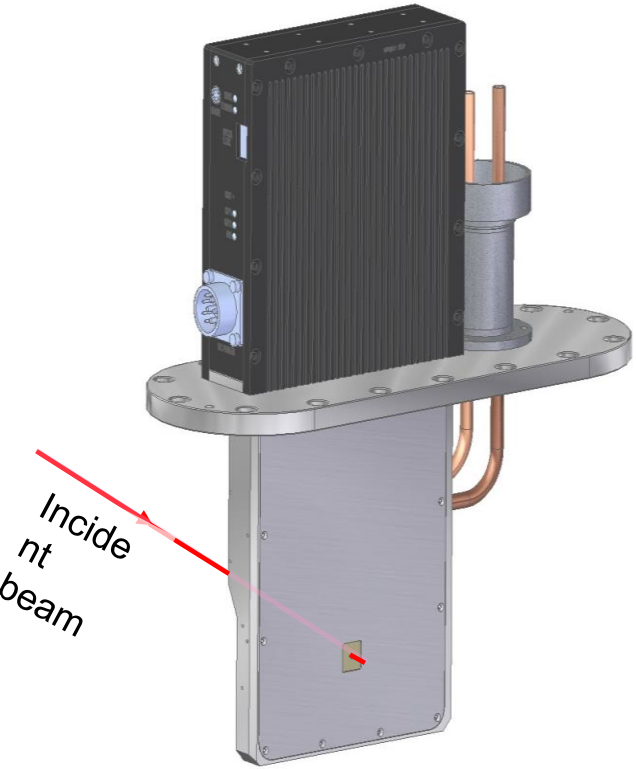





V8
CSIRO
CSIRO

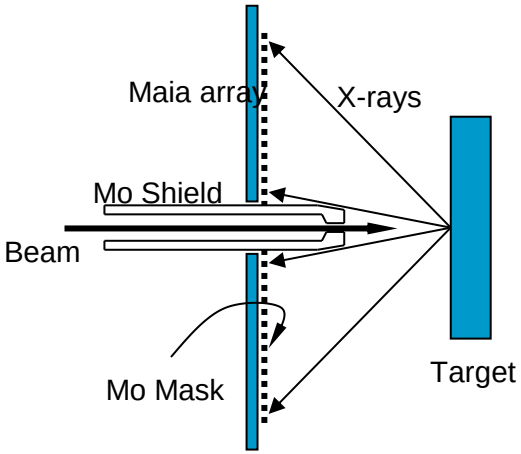




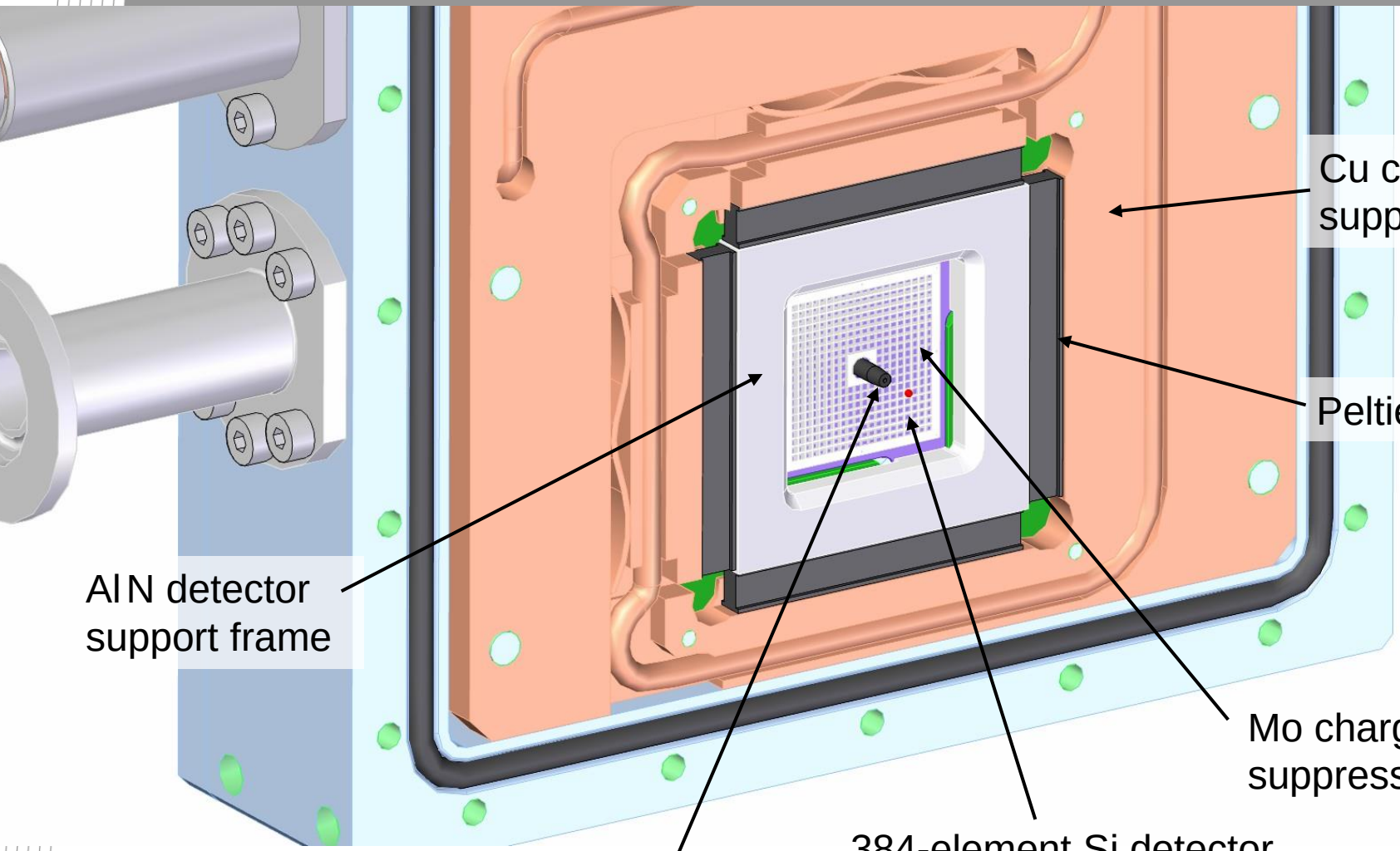


P I STAGE

- **X,Y stages**
  - ✓ Micos PLS-85 (102 mm travel)
  - ✓ Stepper motor, 0.5 µm microstep
  - ✓ Encoder (LS-010) repeatability: 0.1 µm
  - ✓ Velocity up to 100 mm/s
- **Z stage**
  - ✓ Micos MTS-70 (10 mm travel)



Maia Detector
Detector wafer, sample side



Kirkham *et al.*, AIP Conf. Series 1234 (2010) 240.

32 CHANNEL DATA AQUASITION SYSTEM

3 units purchases 1-C.S.I.R.O
1- each beam line

- **Pulse capture**
  - ✓ Input conditioning for standard NIM amp pulses
  - ✓ SCEPTER capture of E, T
  - ✓ 16x front panel BNC and 16x Mesytec parallel
  - ✓ 4x serial (16 MHz) interface to NIM ADCs (Canberra)
- **Processing in FPGA**
  - ✓ Similar to Maia pipeline, plus GUI display
- **Stage and scanning control**
  - ✓ XYZ stage drive and encoder readback
  - ✓ XY DAC drive for electrostatic beam scanning

WHAT DOES THE FUTURE LOOK LIKE FOR THE PELLETRON

?