Advanced Neutron Detectors with Pad Readout

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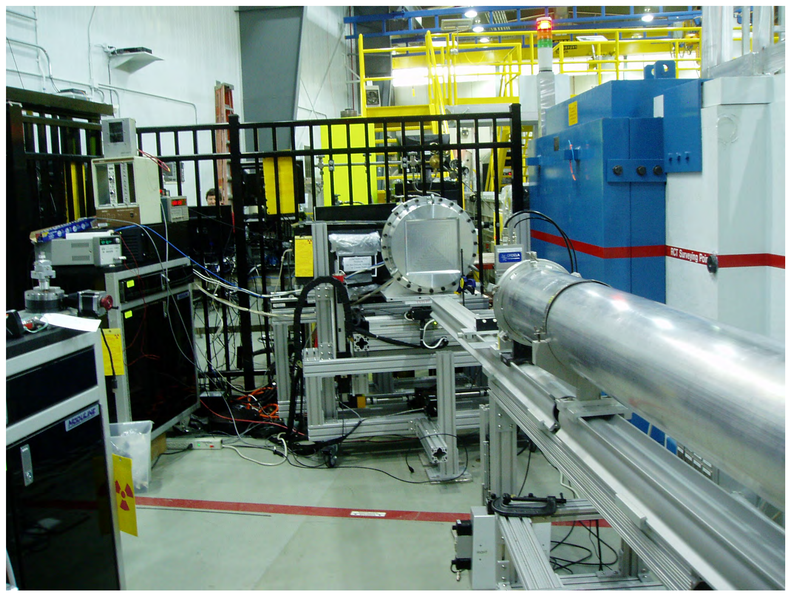
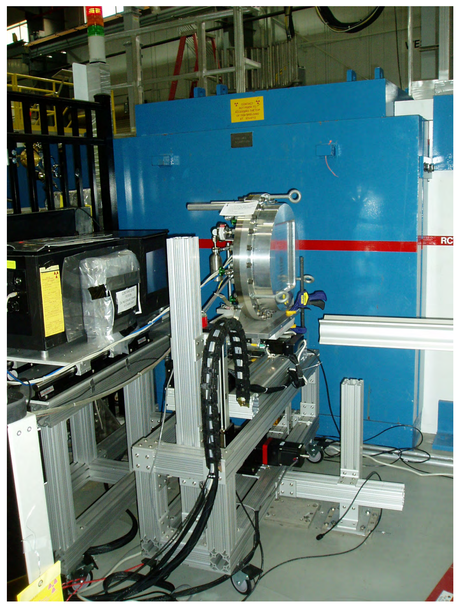
Neutron beam tests at CG1D of HFIR (Instrument Development Beamline)

General view of beamline CG1D



Pad detector on X-Y stage at end of CG1D beamline

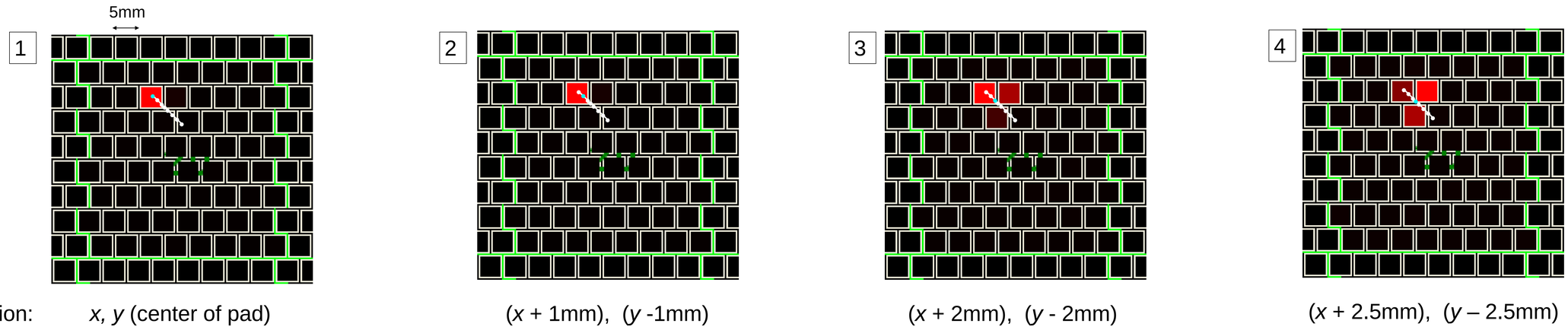


Side view of pad detector on X-Y stage

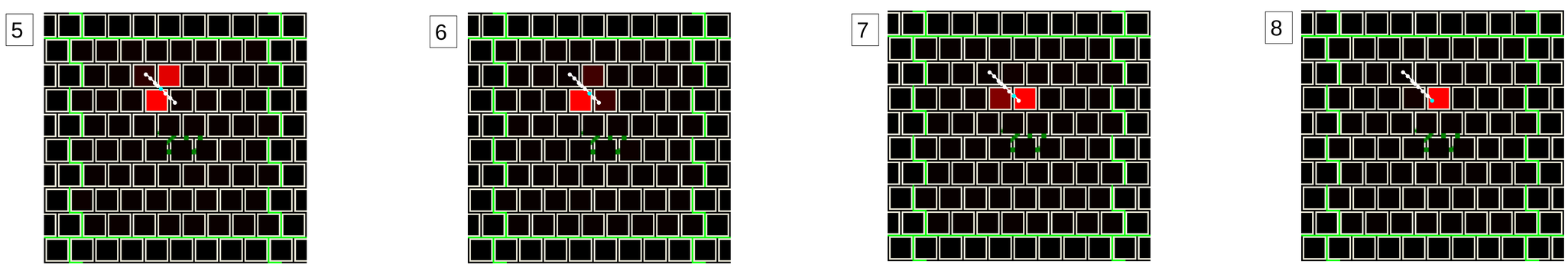
Results from scanning a 1mm diameter beam diagonally across two pad rows:
blue circle represent position of beam, white circles represent previous/next positions

Green boundary outlines those pads feeding one particular 64-channel ASIC

Red brightness is a relative measure of electron charge collected by that corresponding pad



Beam Position: *x, y* (center of pad) | (*x* + 1mm), (*y* -1mm) | (*x* + 2mm), (*y* - 2mm) | (*x* + 2.5mm), (*y* – 2.5mm)



Beam Position: (*x* + 3mm), (*y* - 3mm) | (*x* + 4mm), (*y* - 4mm) | (*x* + 5mm), (*y* - 5mm) | (*x* + 6mm), (*y* - 6mm)

Position resolution is better than half a pad pitch, or 2.5mm

Rate capability is 2.5kHz per pad/channels, with total of 2304 channels

Exceeds rate capability of existing detectors by ~ two orders of magnitude

Long term stability is extraordinarily good – operation in ionization mode

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