NeutronOptics Grenoble

http://neutronoptics.com/

Who are we ?

- NeutronOptics is a small Grenoble company (France)
- We develop and market X-ray and Neutron cameras
- For both Beam Alignment and High Resolution Imaging
- Founded in 2007 by Dr Alan Hewat, formerly from ILL
- Who are our Clients ?

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Who are our Clients – Small Companies & Large National Labs

- **400 NeutronOptics cameras delivered in 18 years**

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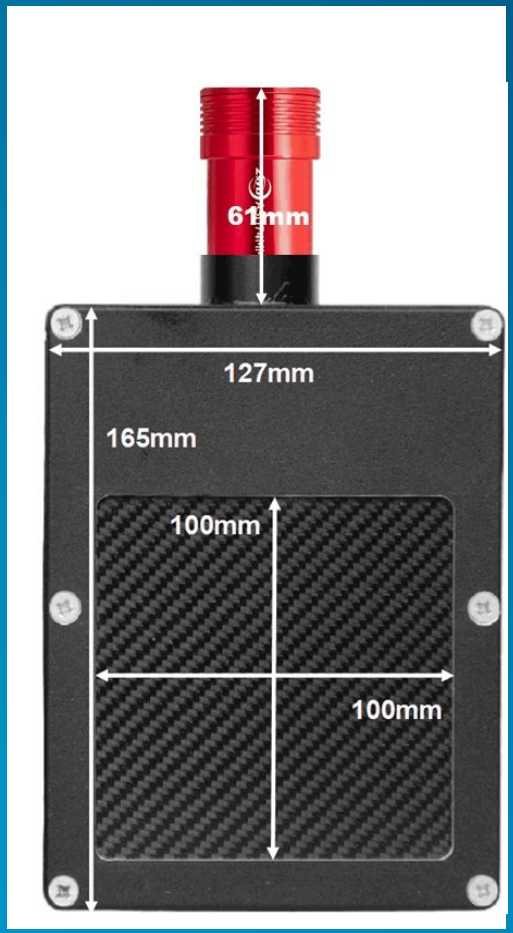
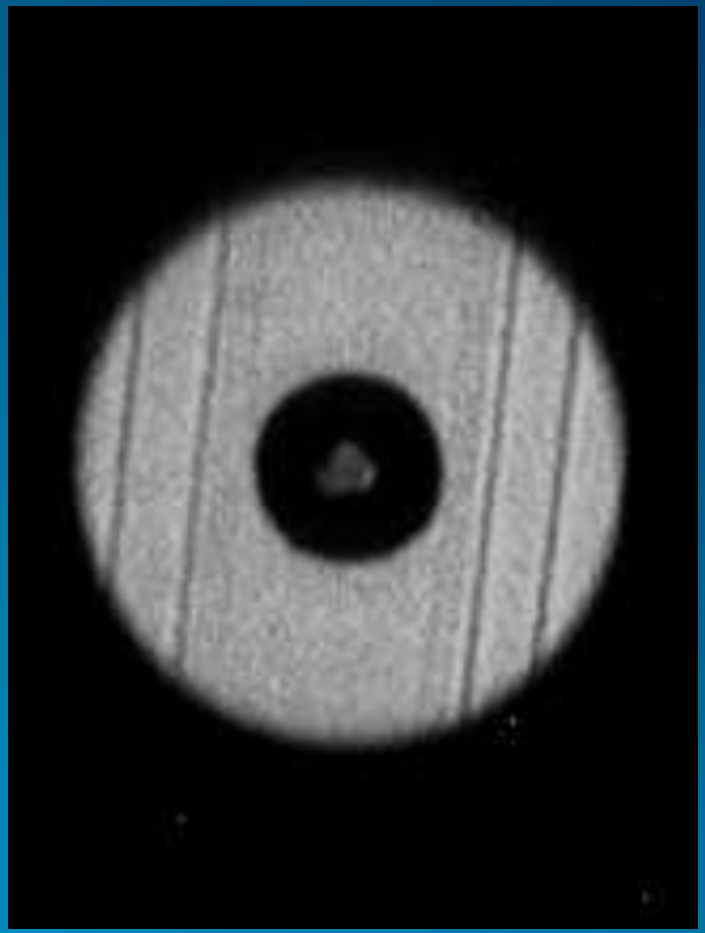
Two Kinds of Camera – 1) Simple Alignment Cameras

- Sensitive Sony CMOS neutron (left) and x-ray (right)
- Sample in cryostat in neutron beam

100x100mm camera, Sony **IMX741 CMOS**





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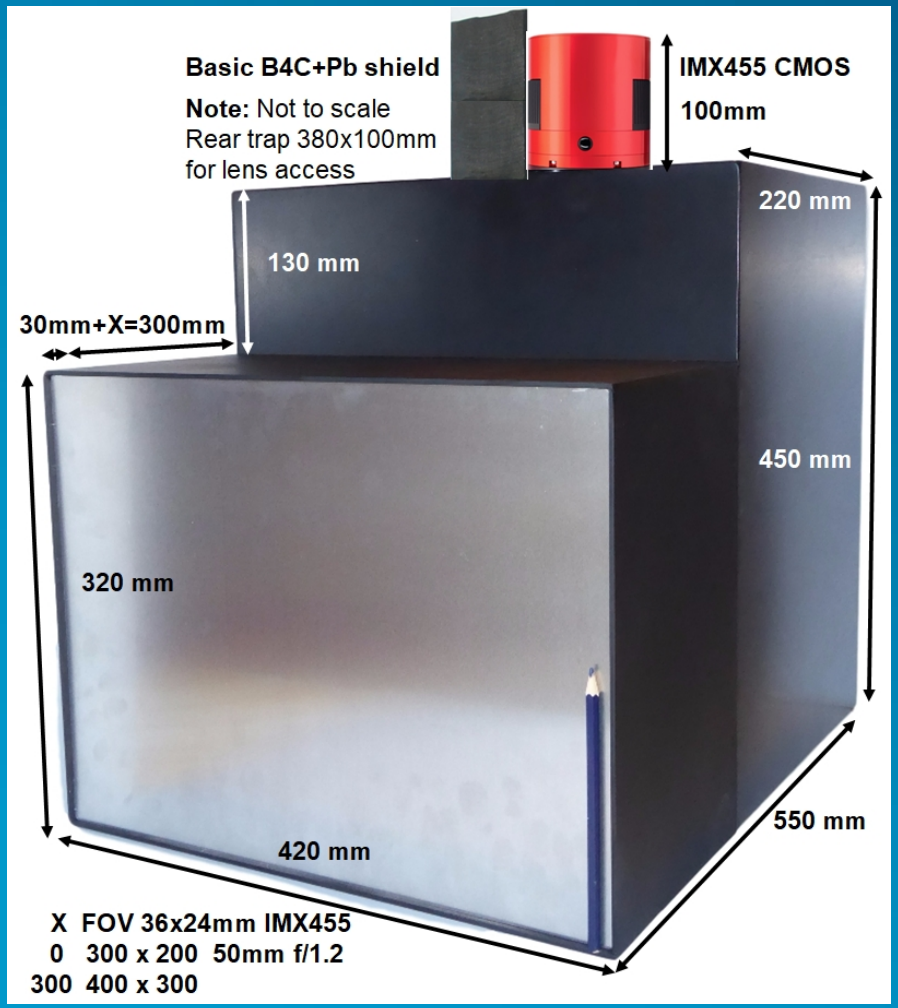
2) High Resolution Cameras For Neutron & X-ray tomography



- Field-Of-View FOV: 400x300 mm
- X-ray Scintillators : Agfa-Gevaert CAWO OG2
- Neutron Scintillators : Scintacor/RC-TriTec
- Optics : Nikon f/1.2 lens
- Sensor: 36x24mm Sony IMX455 Pregius CMOS
- Resolution: up to 9576x6388 pixels
- Optical Resolution: ~50 µm
- High sensitivity: (QE~90%)
- Low Dark current: 0.002 e/pix/s @ -15 °C
- Cooling: Regulated Peltier ΔT = -35°C
- Digital Output: 16-bits
- Readout Speed: Up to 16 frames/s
- Binning & Region-of-Interest: x2 x4
- External Trigger: Software for Tomography
- Software: Included ASIStudio and SharpCap
- As supplied to Oak Ridge National Laboratory

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What do you Need to Know ?

- You need a Neutron or X-ray source (continuous or pulsed)
- Large labs buy our cameras – easier than making them in-house
- Simple Design with no moving parts – easy to repair & upgrade
- Efficiency = Detector Area / Imaging Area – smaller FOV is better
- CMOS cameras = most imaging needs c.f. Area Detectors
- Peltier Cooling ΔT = -35°C to reduce noise with 16-bit digital output
- Thermal Neutron Scintillators use 6Li fission – very efficient
- X-ray Scintillators also efficient – more intense sources
- User can easily exchange Neutron and X-ray scintillators in-situ
- Resolution is limited by the beam & scintillator – not the camera

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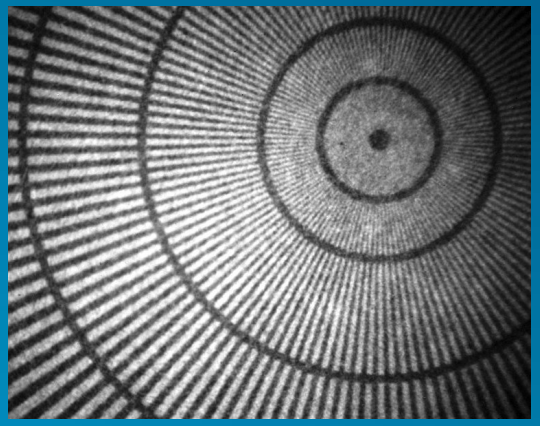
Special Cameras for Special Needs

- Mini i-Cam for X-rays or Neutrons

- Custom cameras for X-rays or Neutrons

- High resolution Macro cameras



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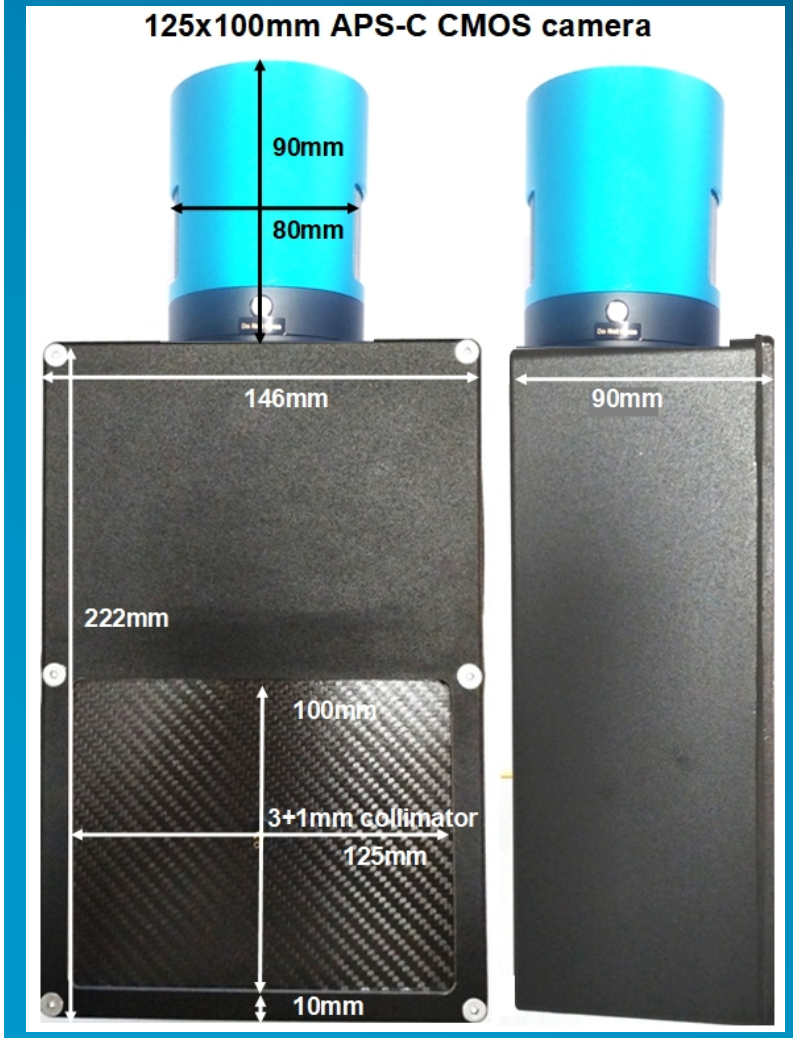
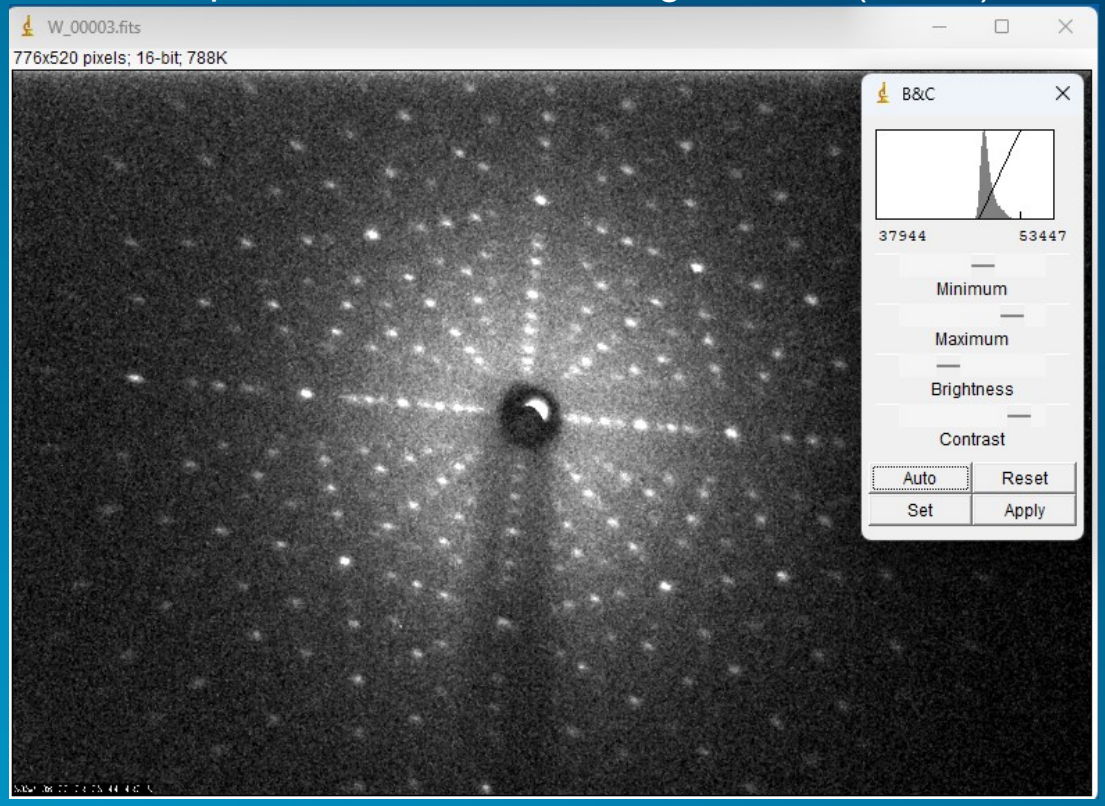
CMOS Real-time x-ray Laue Alignment Camera



- Sensor: Sony CMOS IMX571
- Chip size: 23.5x15.7mm (APS-C)
- Optical Aperture: f/0.95
- Cooling: Thermoelectric: ΔT=-35°C
- 30s exposure with 2kW, 35kV generator (below)



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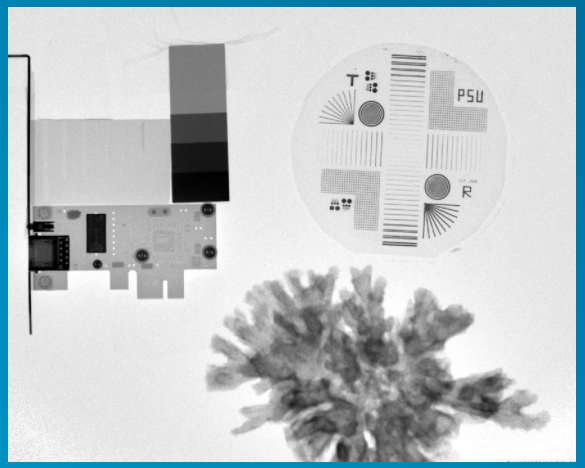
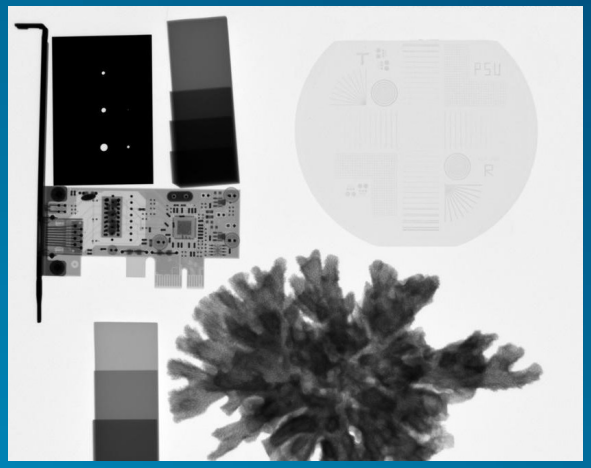
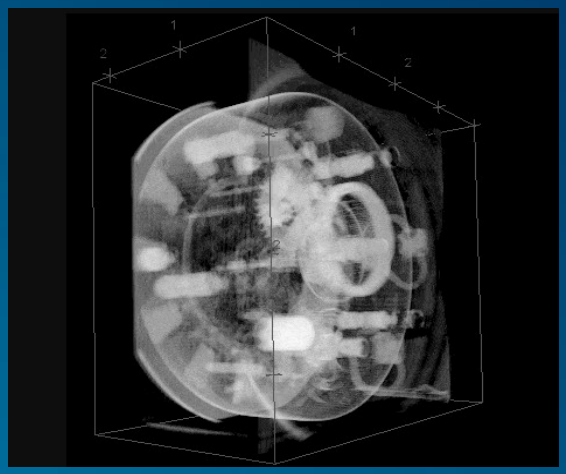
Neutron and X-ray Imaging Examples



1) Neutron Image



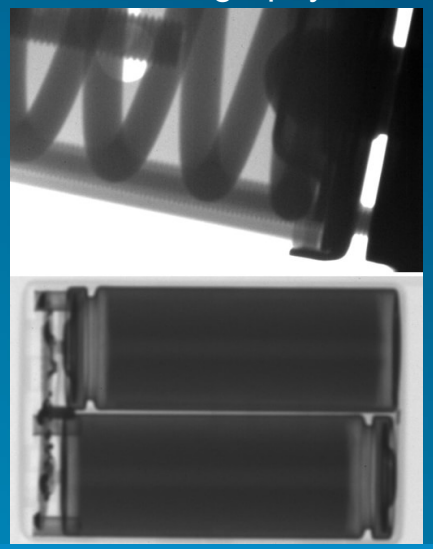
2) X-ray image



3) Neutron 3D tomography

4) Oil Painting to be analyzed

5) Oil painting with x-rays



6) Pulsed high energy x-rays