



Australian Government

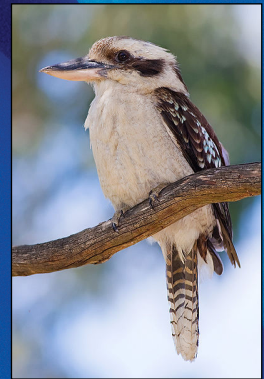
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Kookaburra A State-of-the-Art USANS Instrument

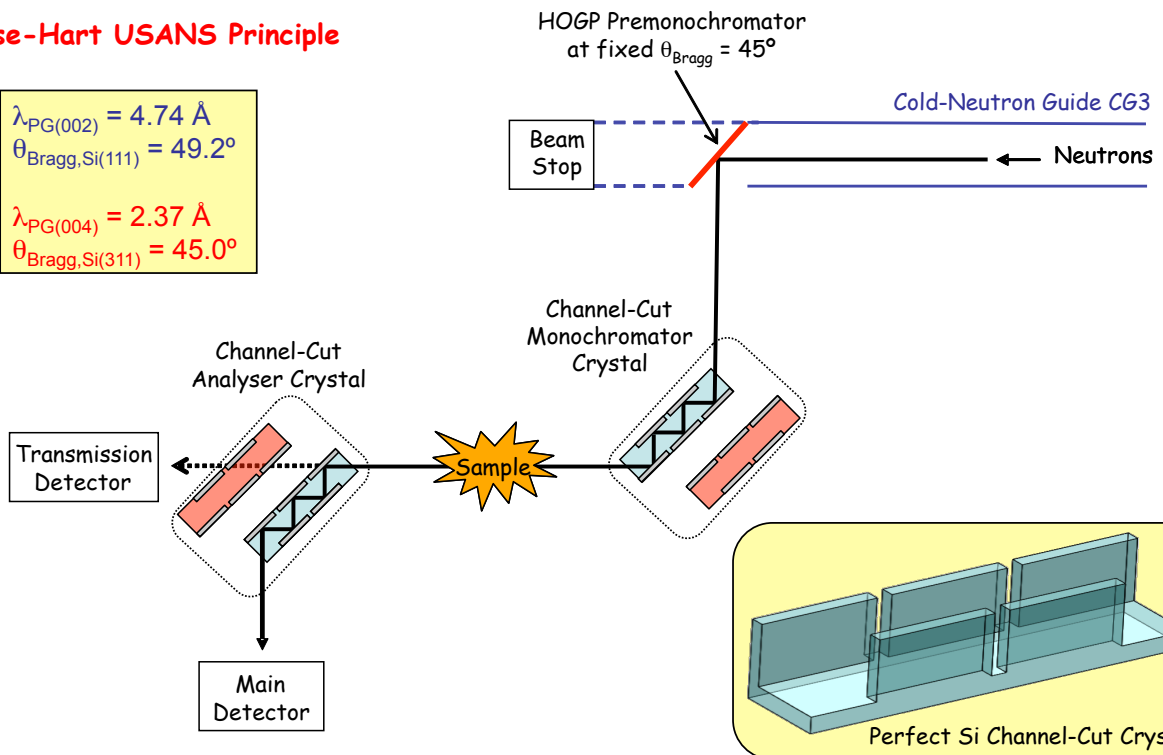
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Bonse-Hart USANS Principle

$\lambda_{PG(002)} = 4.74 \text{ \AA}$
$\theta_{\text{Bragg, Si}(111)} = 49.2^\circ$
$\lambda_{PG(004)} = 2.37 \text{ \AA}$
$\theta_{\text{Bragg, Si}(311)} = 45.0^\circ$

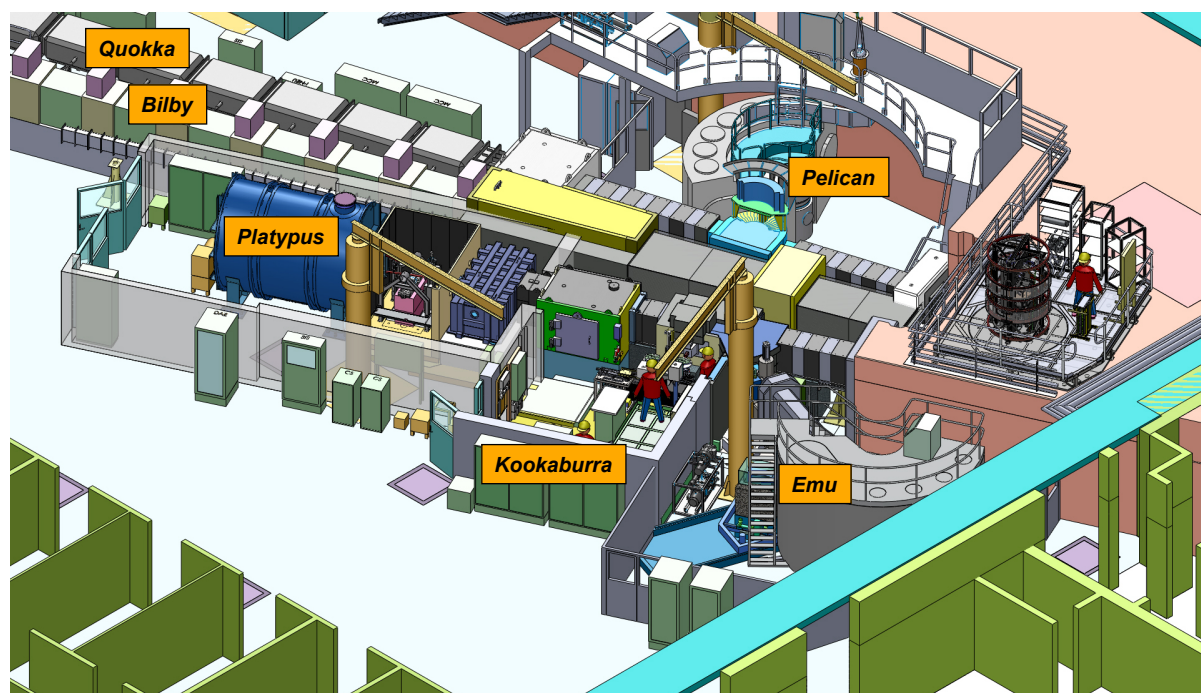


Characterisation of Microstructures, 0.1 - 10 μm

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OPAL Cold-Neutron Guide Fauna



Kookaburra Budget: \$2,77M

Completion: June 2013

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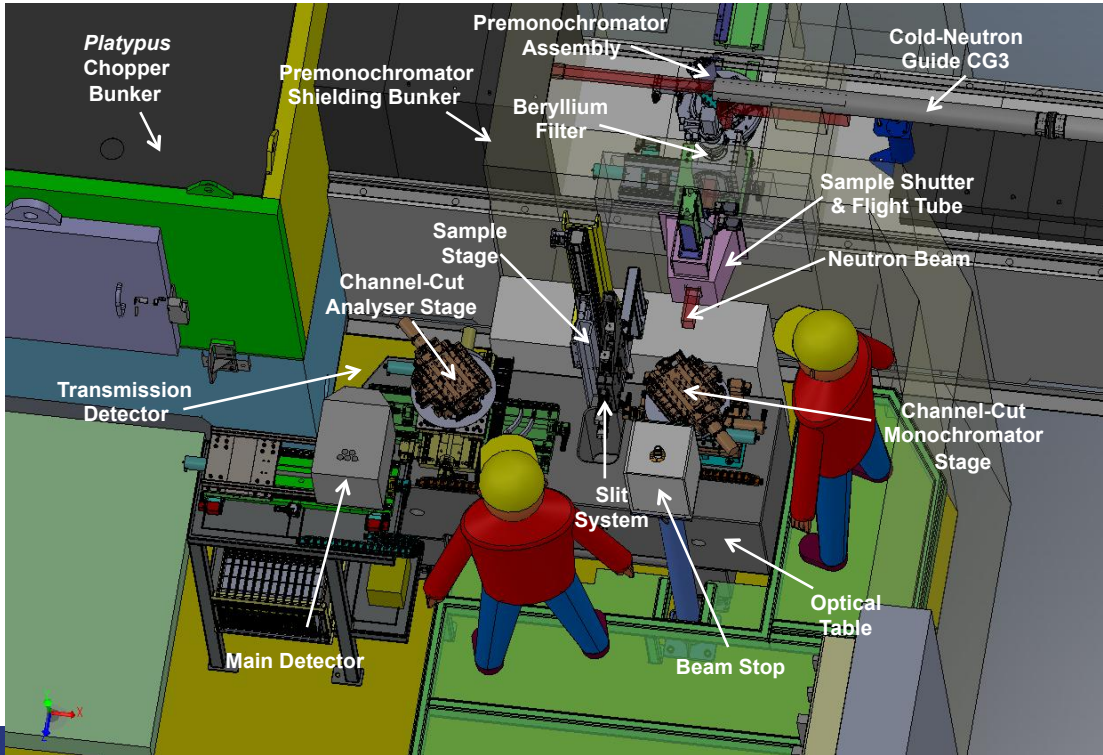
Choice of Premonochromator and Channel-Cut Crystals

	Option 1	Option 2	Future Upgrade
• Wavelength	$\lambda_1 = 4.74 \text{ \AA}$	$\lambda_2 = 2.37 \text{ \AA}$	$\lambda = 2.32 \text{ \AA}$
• Premonochromator (PM)	PG(002) Doubly Focusing $\theta_{\text{Bragg,PM}} = 45.0^\circ$	PG(004) Doubly Focusing $\theta_{\text{Bragg,PM}} = 45.0^\circ$	[Si(311)/Ge]g Doubly Focusing $\theta_{\text{Bragg,PM}} = 45^\circ$
• Higher-Order λ Filter	In	Out	Out
• Channel-Cut Crystal (CC)	Si(111) $\theta_{\text{Bragg,CC}} = 49.1^\circ$	Si(311) $\theta_{\text{Bragg,CC}} = 46.4^\circ$	Si(311) $\theta_{\text{Bragg,CC}} = 45^\circ$
• Full Darwin Width	$2\Delta\theta_D = 21 \mu\text{rad}$	$2\Delta\theta_D = 5.4 \mu\text{rad}$	$2\Delta\theta_D = 5.1 \mu\text{rad}$
• $q_{\text{min}} = 4\pi \Delta\theta_D / \lambda \text{ (\AA}^{-1}\text{)}$	$2.78 \cdot 10^{-5} \text{ \AA}^{-1}$	$1.43 \cdot 10^{-5} \text{ \AA}^{-1}$	$1.38 \cdot 10^{-5} \text{ \AA}^{-1}$
• Flux on Sample	190,000 n cm ⁻² s ⁻¹	23,000 n cm ⁻² s ⁻¹	39,000 n cm ⁻² s ⁻¹

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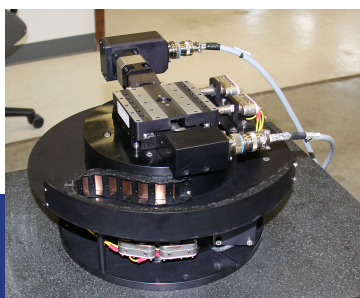
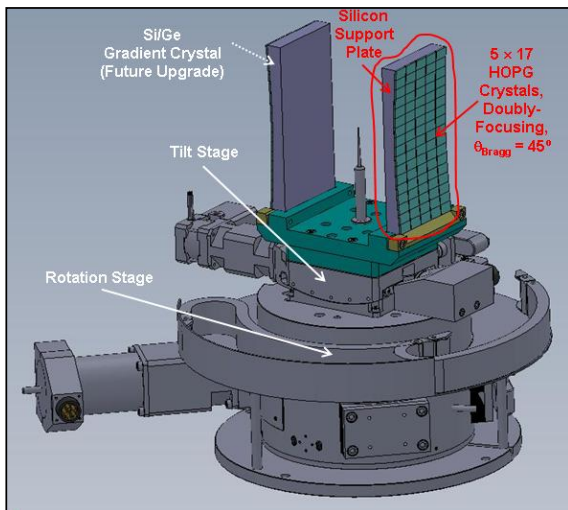
Kookaburra USANS Instrument



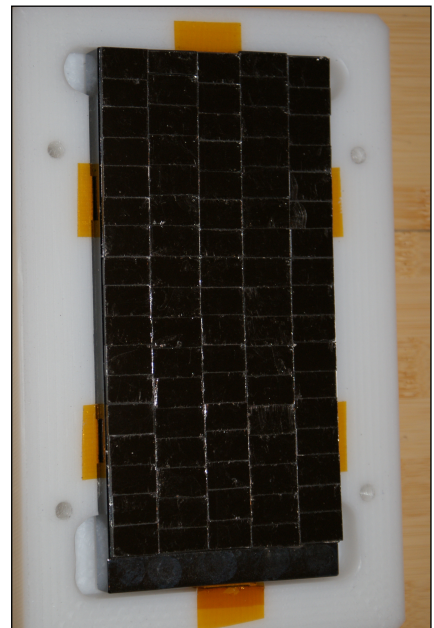
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Kookaburra Premonochromator Assembly



Silicon Support Plate



5x17 HOPG Crystals mounted to Silicon Support Plate

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Kookaburra Optical Table Motion Stage Assembly



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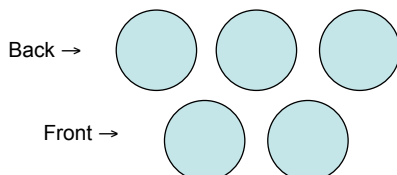
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Kookaburra Detector System

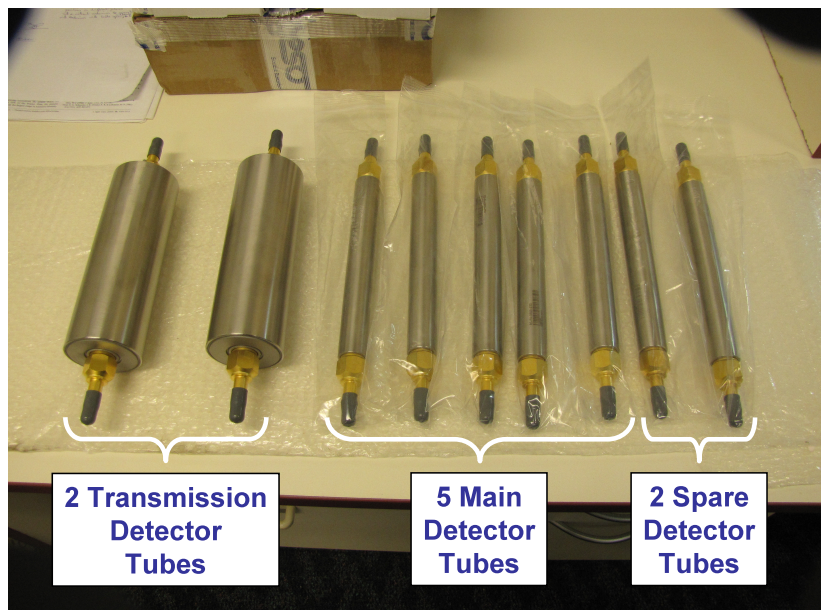
GE Reuter-Stokes ^3He -filled
Cylindrical Detector Tubes,
Position-Sensitive

Main Detector: 5 Tubes
(Same array as at NIST and KIST)

$\varnothing = 1"$, $l = 5"$, 4 ATM
equidistant (0.6 cm)



Transmission Detector: 2 Tubes
 $\varnothing = 2.5"$, $l = 5"$, $\ll 1$ ATM



Detector Readout System: Mesytec (ANSTO Standard)

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2009

2010

2011

2012

2013