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Nuclear-based science benefiting all Australians

Neutrons and Food and ANSTO update

Herma Büttner, ANSTO

NMI3 General Assembly,

9 November 2011

Operational Neutron Instruments at OPAL reactor

Platypus
(Reflectometer)

Wombat
(Hi-Intensity Powder)

Koala
(Laue diffractometer)

Quokka
(SANS)

Kowari
(Residual Stress)

Echidna
(Hi-Resolution Powder)

In Construction

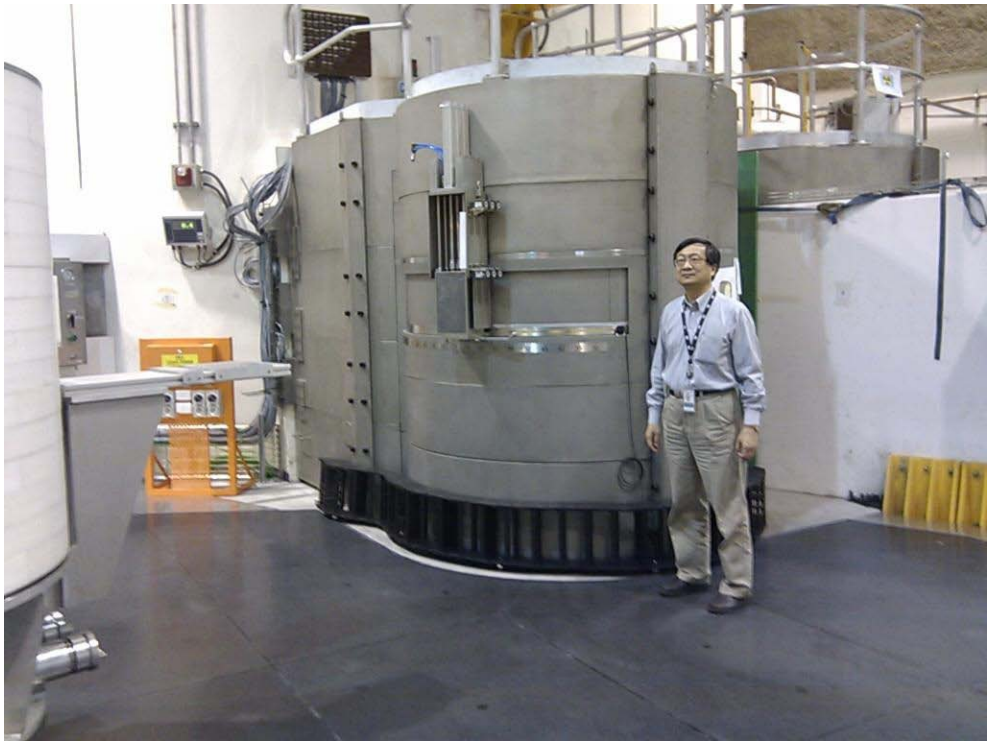
Sika
(Cold TAS)

Pelican
(Time-of-flight polarisation spectrometer)

Kookaburra
(USANS)

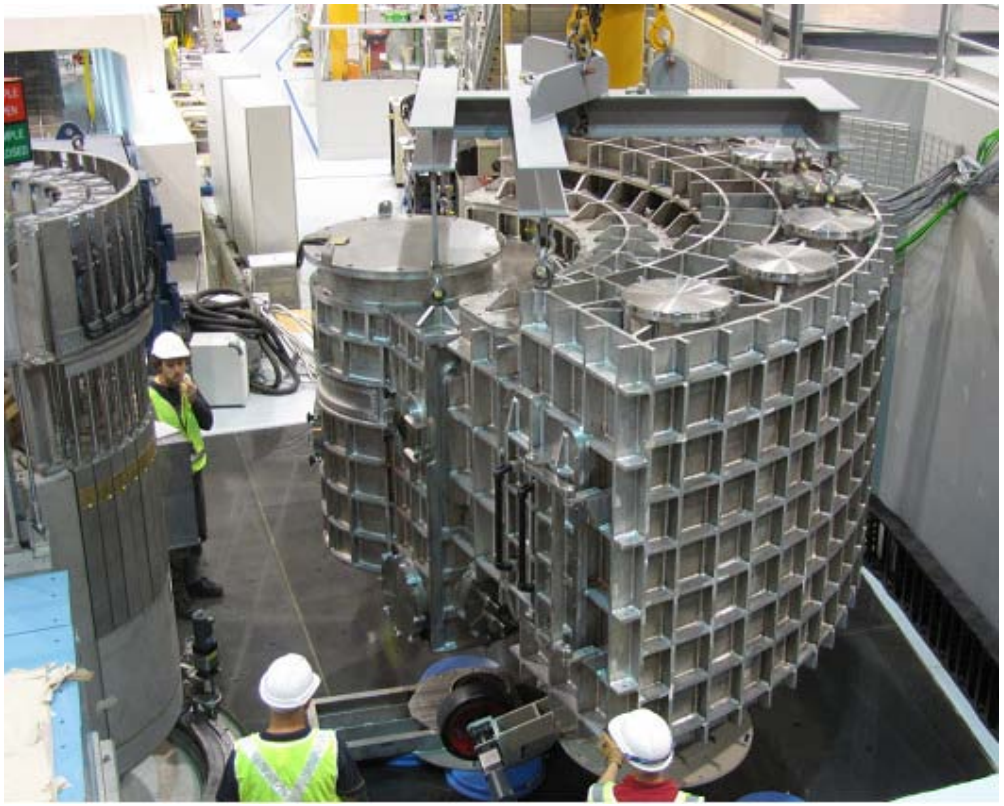
SIKA cold neutron three-axis spectrometer

funded, built, operated by National Science Council Taiwan



View of the preassembled SIKA primary and secondary spectrometers from the bunker entrance

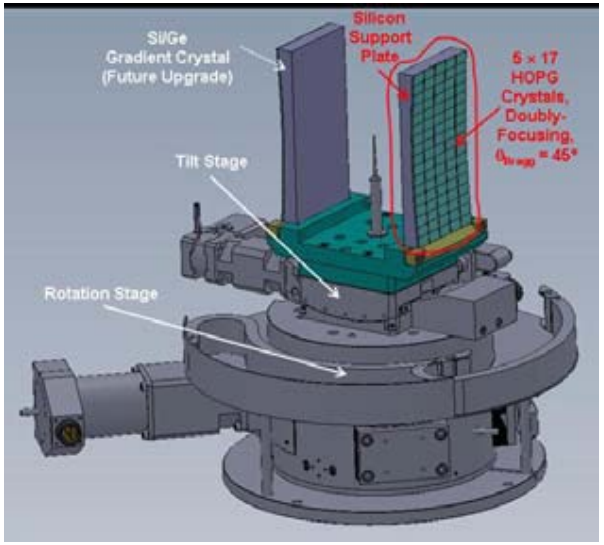
PELICAN time-of-flight spectrometer



The Pelican vacuum tank being manually guided into position on its dance floor.

KOOKABURRA USANS

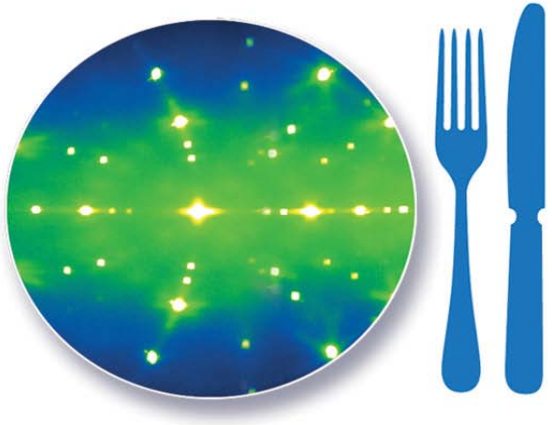
The KOOKABURRA Optical Table and Motion Stages during Factory Acceptance Testing



The KOOKABURRA premonochromator, which is composed of 85 crystals mounted on a machined perfect-silicon back-plate.

The Next Generation

- BILBY – small-angle neutron scattering
- DINGO – radiography/tomography/imaging
- EMU – backscattering spectrometer



Neutrons and Food

Sydney, Australia
31 October – 3 November 2010

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Good Food, Good Life

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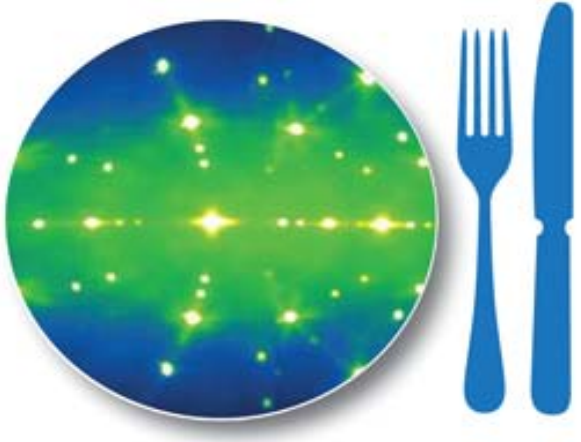
Co-chairs: Mike Davidson and Elliot Gilbert



Neutrons and Food

Sydney, Australia
31 October – 3 November 2010

Keynote speakers

- **Rex Hjelm**, LANSCE, USA - "Bile Physiology and Physical Chemistry in Digestion: Fundamental Insights from Small–angle Neutron Scattering"
- **Carl Holt**, University of Glasgow, UK - "Quantitative models of casein micelle structure derived from SAXS and SANS"
- **John Katsaras**, NRC, Chalk River, Canada - "Neutron Scattering, Hydrogenous Materials and Nutraceuticals"
- **Susan Krueger,** NIST, USA - "Protein structure and interactions in the solid state"
- **Ross Lee,** PTIS, USA - "Need for neutron scattering techniques in packaging"
- **Peter Lillford,** University of York, UK - "Neutrons and Food: What are the problems?"
- **Camille Loupiac,** Université de Bourgogne, France - "How neutron scattering experiments can target the behaviour of model food proteins?"
- **Hans Tromp**, Nizo, The Netherlands - "Neutron scattering study of food structure: gelation, coacervation and the effect of high pressure"
- **Aude Vernhet**, INRA, France - "Colloidal interactions involving condensed tannins in diluted systems: what problems can we solve through SANS?"

Session Topics

- Protein and complexes
- Digestion and metabolic processes
- Drinks and beverages
- Dairy
- Lipids and fats
- Glassy states
- Food packaging and food safety
- Plant materials

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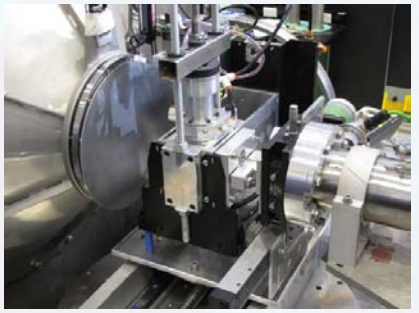
- Over 50 participants: 21 Australians, 4 from New Zealand, 18 from Europe (France, Hungary, Latvia, Netherlands, Sweden, Switzerland, UK), 10 from North America (USA, Canada), 3 from Asia (India, Thailand, Taiwan)
- Speed-networking session stimulating both sides of the food and neutron fence
- Lively discussions focussing on four main areas:
  - model systems;
  - interaction between facility, academia and industry;
  - collaboration and outreach;
  - access to large-scale facilities.

Recommendations:

- Broad approach for model systems, including structural and dynamical measurements using various techniques combined with molecular-dynamics simulation;
- Dialogue between the researchers to ensure viable model;
- New collaborative approaches linking industry and academia and large-scale facilities;
- Multidisciplinary collaborations;
- Identify key meetings in food materials science;
- Workshops that combine different techniques;
- Review neutron scattering proposal access systems for faster turnaround time;
- Neutron facilities to have their own scientific programmes;
- Good outreach, especially in the area of health and nutrition;
- Fact sheets (basic technological facts) for the food industry, list of methods, and example studies that can be utilised to solve problems in food science.



The rapid Visco Analyser and sample in the QUOKKA beam.

Welcome reception

Dinner: Sydney harbour cruise

Melbourne Cup – horse race

ANSTO tour

- Positive feedback
- Good media coverage (over 10 articles, various interviews)
- CD (for participants): all presentations, abstracts, photos and a detailed report; report available on http://www.nbi.ansto.gov.au/neutronsandfood/documents/nf_workshop.pdf
- Follow up workshop in Delft 29 Jan. – 1 Feb. 2012 in Delft, the Netherlands (Wim Bouman, TU Delft and Erik van der Linden Wageningen University), as part of the ESS Science Symposia http://neutronfood.tudelft.nl/ - deadline for abstracts 8 December 2011

7th International Sample Environment Workshop

17 - 20 September 2012

- For experts in sample environment from neutron scattering facilities discussing new developments and techniques between scientists, engineers, technical staff and companies.
- Venue: Amora Hotel Jamison Sydney (same as neutrons and food)
- Contact Paolo Imperia paolo.imperia@ansto.gov.au
- More info: http://www.ansto.gov.au/sew2012

15th International Small Angle Scattering Conference
18-23 November 2012
Sydney Convention and Exhibition Centre
http://www.sas2012.com/

25-28 November 2012 (satellite meeting SAS2012)
"Structure and Dynamics of Condensed Matter by Scattering Methods" – in celebration of John White's 75th Birthday
Hunter Valley (wine region 200km north of Sydney)

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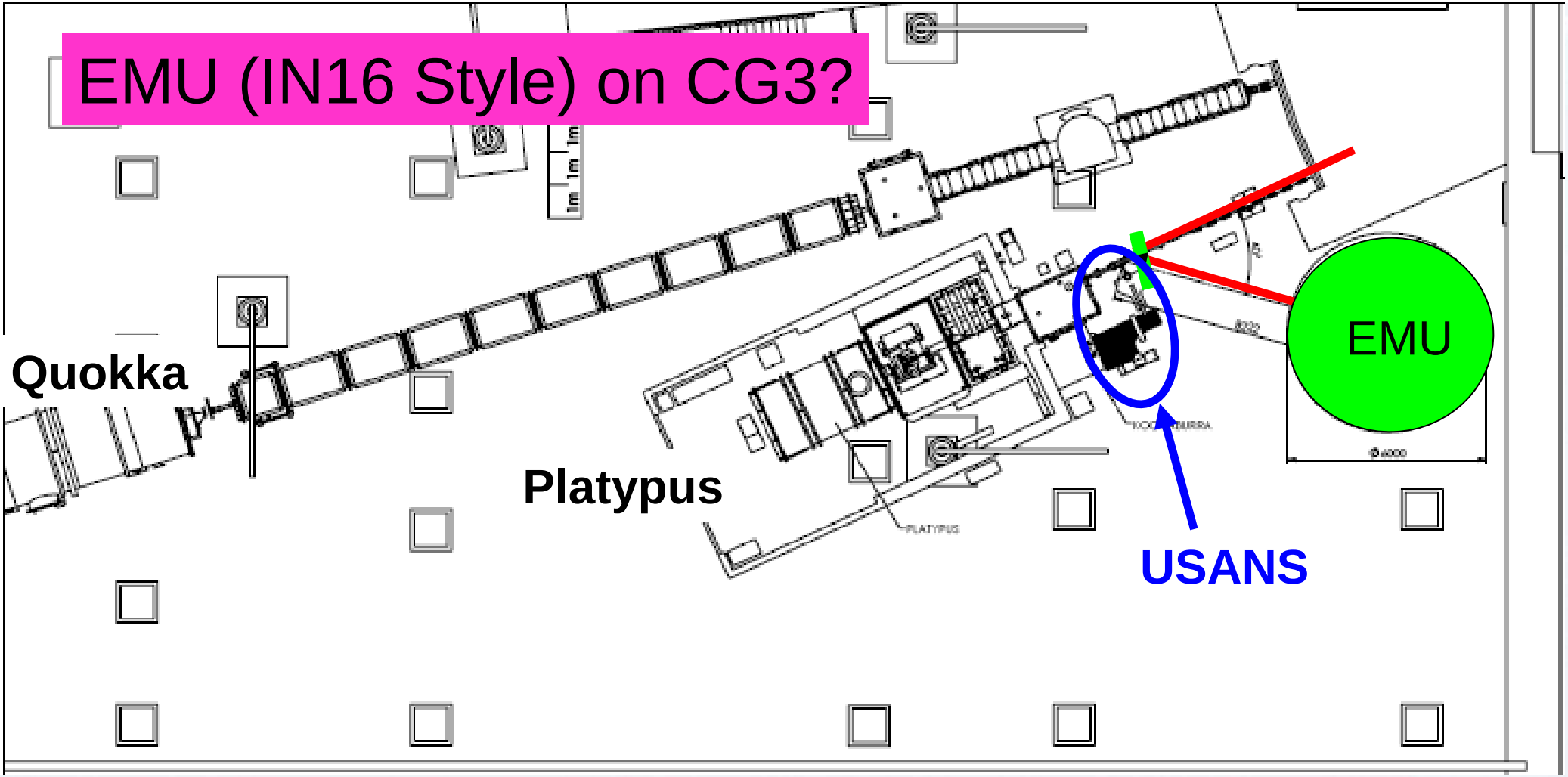
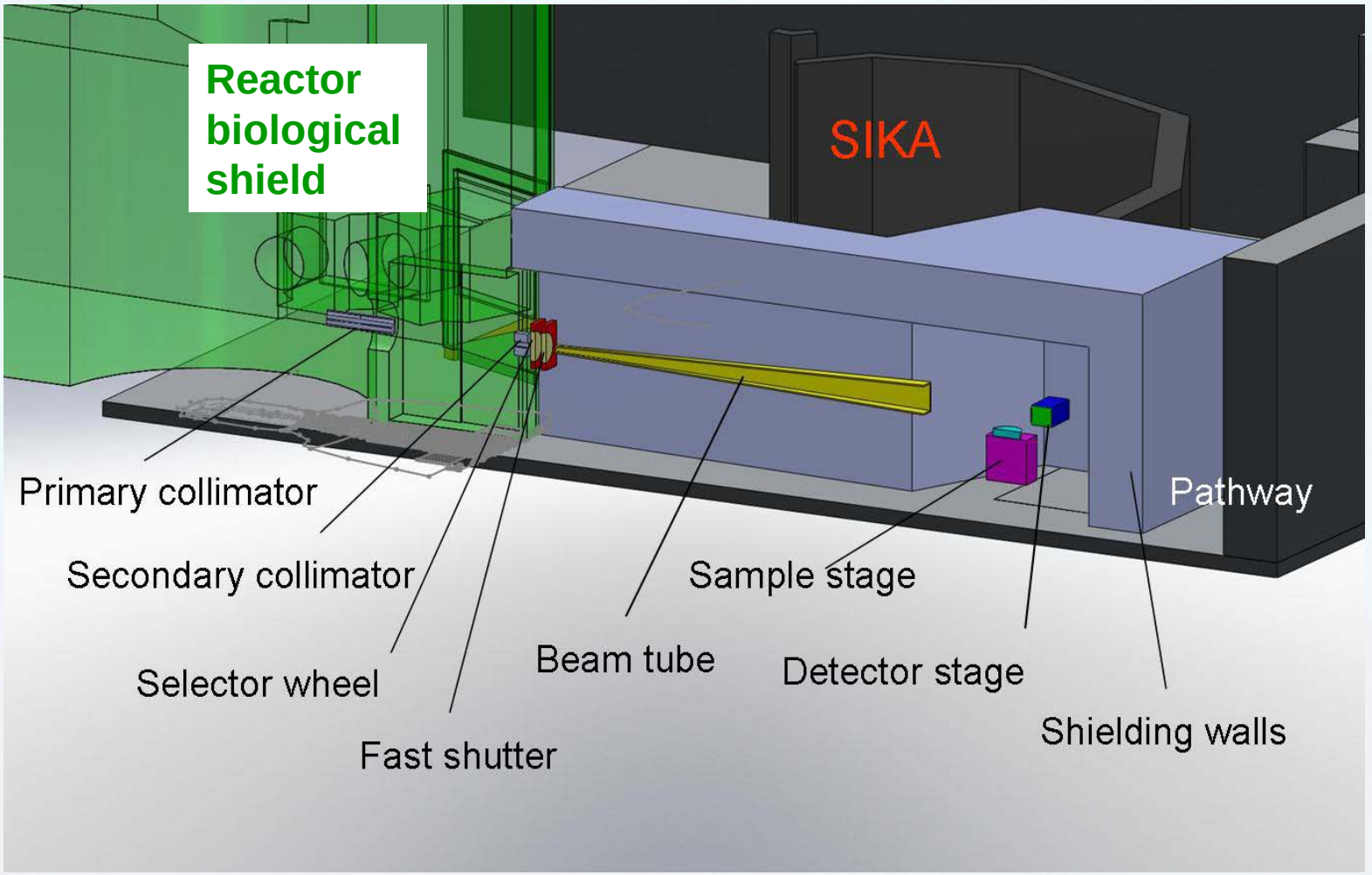
Thank you

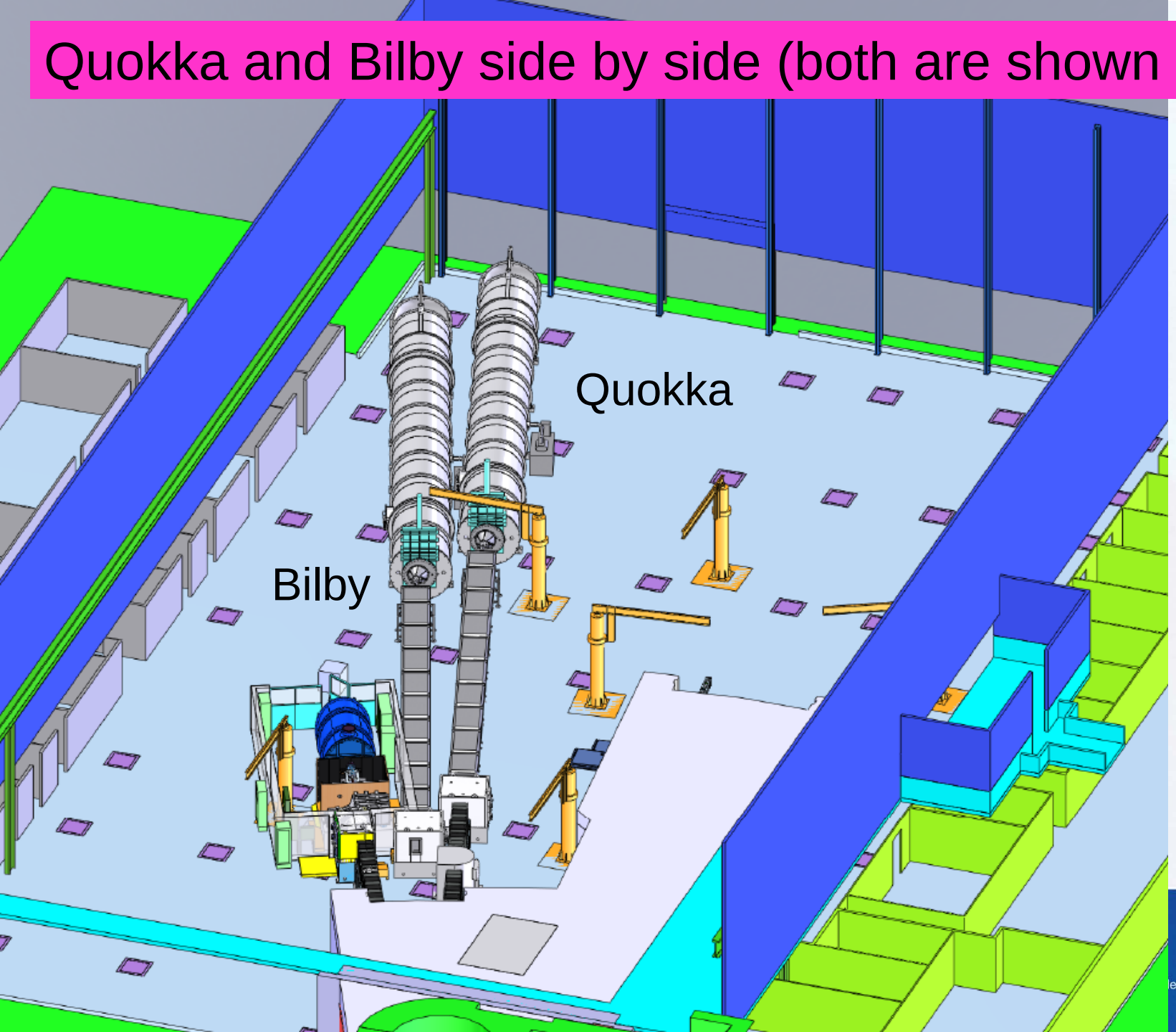
EMU (IN16 Style) on CG3?



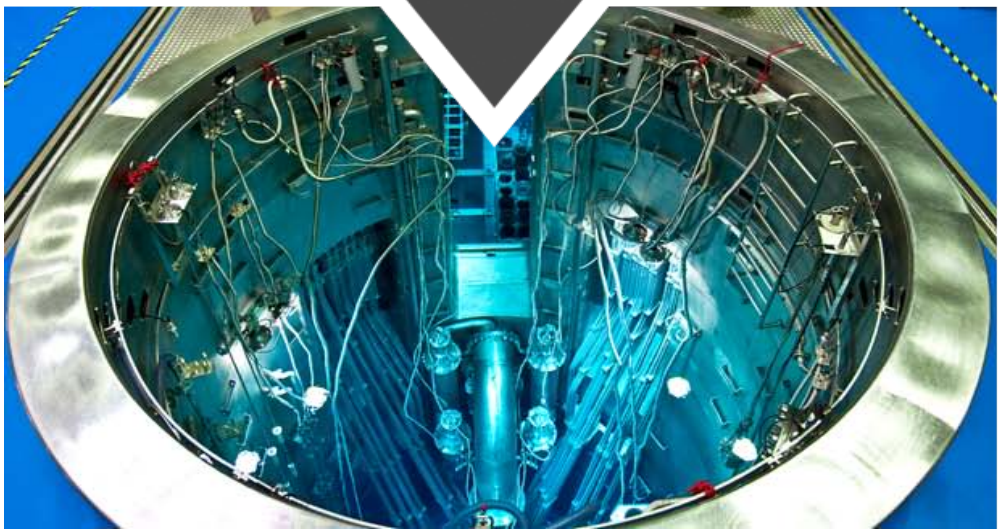
DINGO (Radiography/Tomography/Imaging) on HB1 (reactor hall, thermal beam, no guide)



Quokka and Bilby side by side (both are shown 40 m long)



Platforms for collaboration



Reactor systems

Accelerator systems

Italian-Australian Archaeology and Cultural Heritage Workshop: New Scientific Techniques in Archaeology, Palaeo-Anthropology and Cultural Heritage, 11-17 March 2011

- 14 Italian, 37 Australian and 2 Indonesian
- use of scientific techniques: accelerator mass spectrometry, DNA analysis, and x-ray, neutron and ion-beam analysis
- work on the origins of human-beings were highlighted along with chronological investigations
- general studies of archaeological objects, ancient environments and the analysis of modern objects of cultural significance
- discussions regarding the applicability and suitability of particular techniques, their limitations, and future capabilities; context in which the artefacts and localities under investigation were produced, used and established