Australian Government

Ansto

Nuclear-based science benefiting all Australians

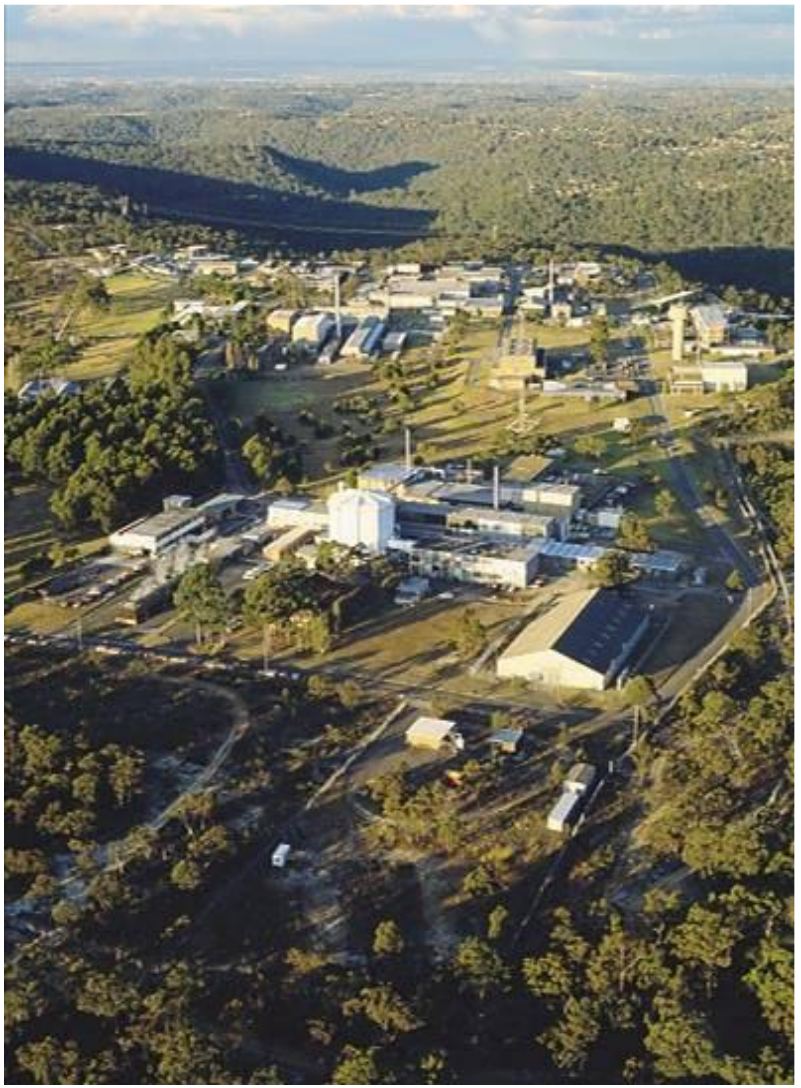
Establishment of the Neutron Beam Research Facility at the OPAL Reactor

Shane Kennedy and Rob Robinson,

The Bragg Institute, ANSTO

- Past – neutron beam research in the HIFAR era
- Progress – the OPAL Neutron Beam Facility (construction & operations)
- Future - prospects & challenges to meet our goals

The HIFAR Research Reactor (1958-2007)



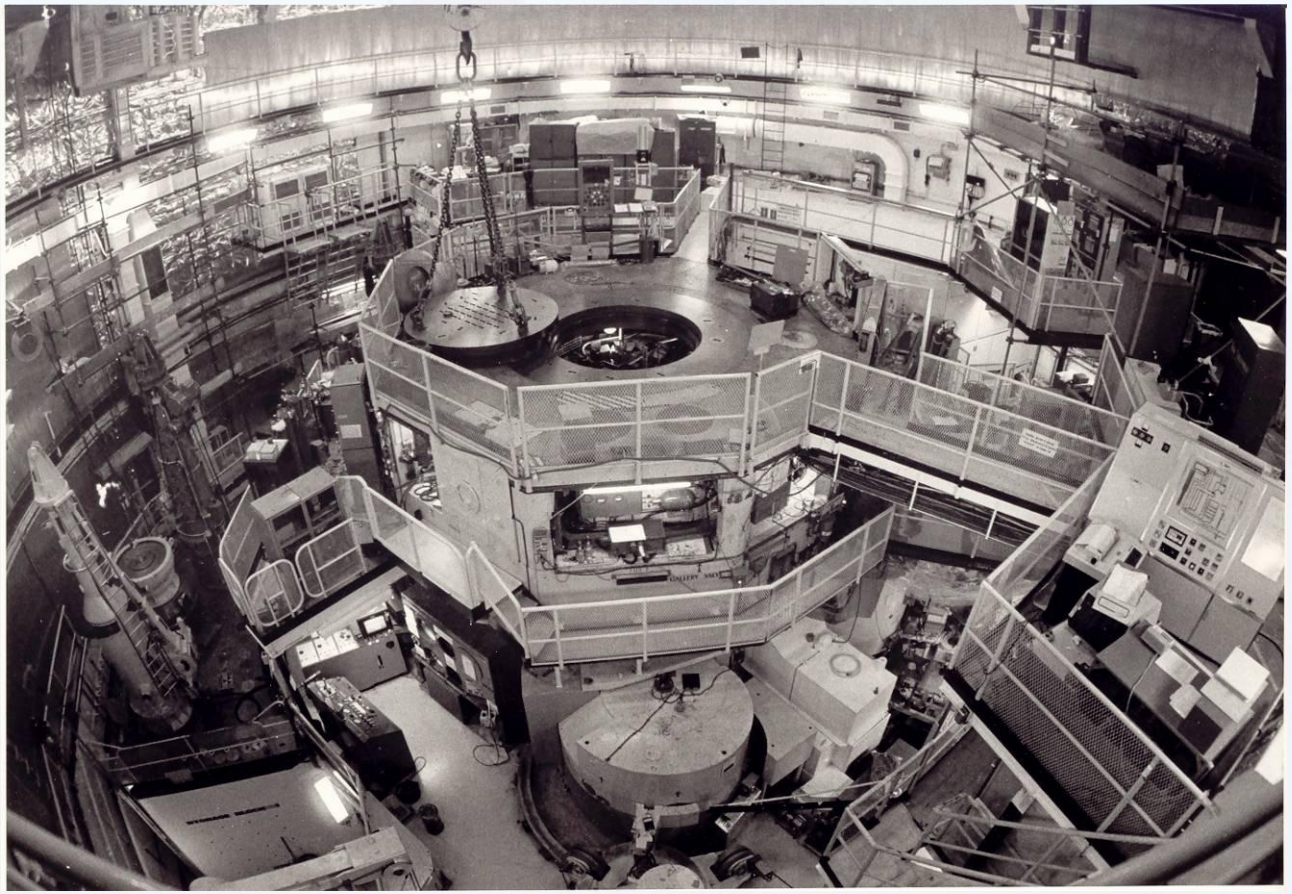
10 MW multipurpose research reactor built by the AAEC

Prime Minister Robert Menzies at the controls

Utilization of the HIFAR Reactor: growth to saturation

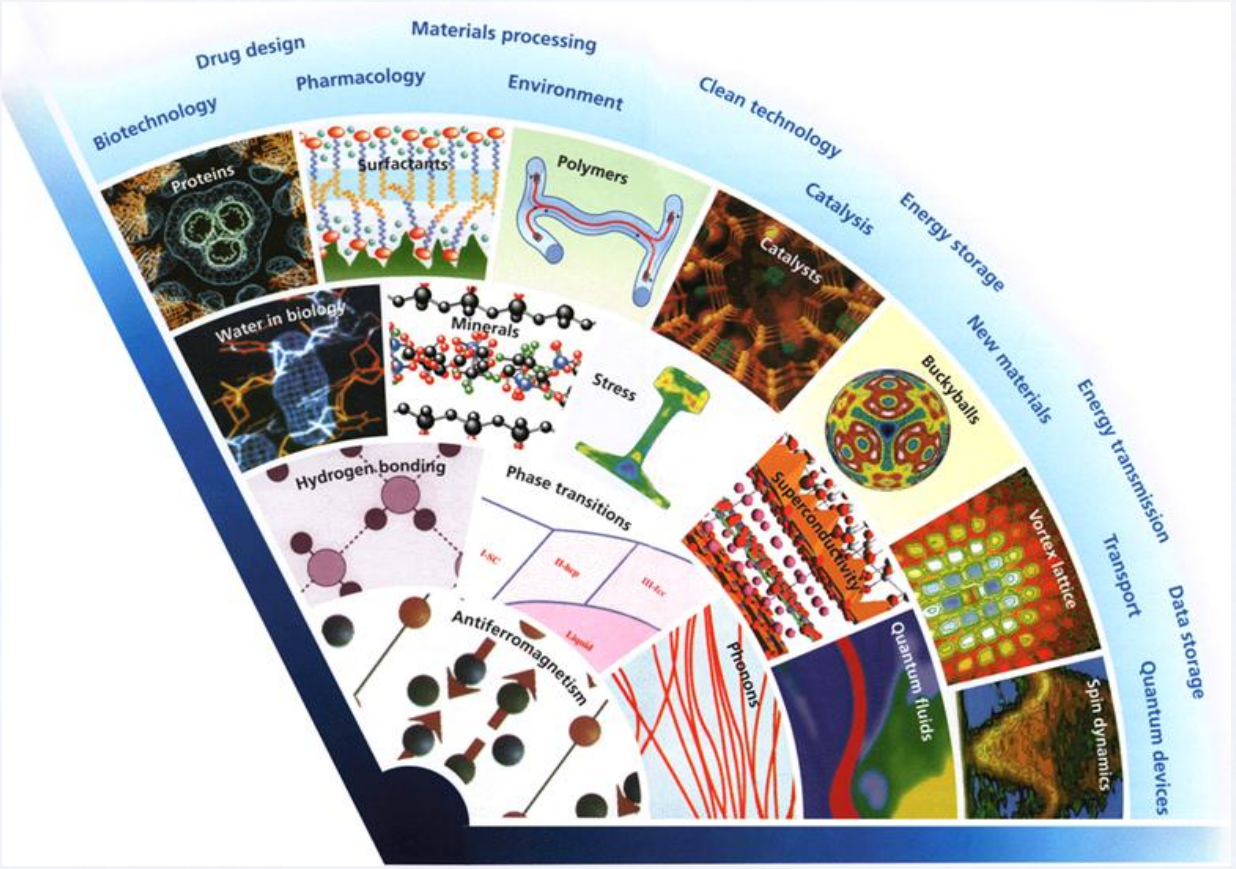
Materials testing, Neutron beam science, Radiopharmaceuticals, NTD Silicon

1958



~1980

Six decades of neutron beam applications

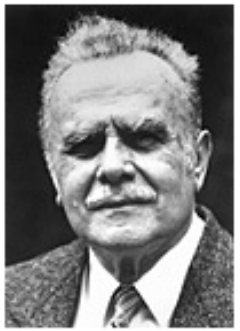


The Nobel Prize in Physics 1994

"for pioneering contributions to the development of neutron scattering techniques for studies of condensed matter"

"for the development of neutron spectroscopy"

"for the development of the neutron diffraction technique"



Bertram N. Brockhouse

1/2 of the prize

Canada

McMaster University
Hamilton, Ontario, Canada

b. 1918

Clifford G. Shull

1/2 of the prize

USA

Massachusetts Institute of Technology (MIT)
Cambridge, MA, USA

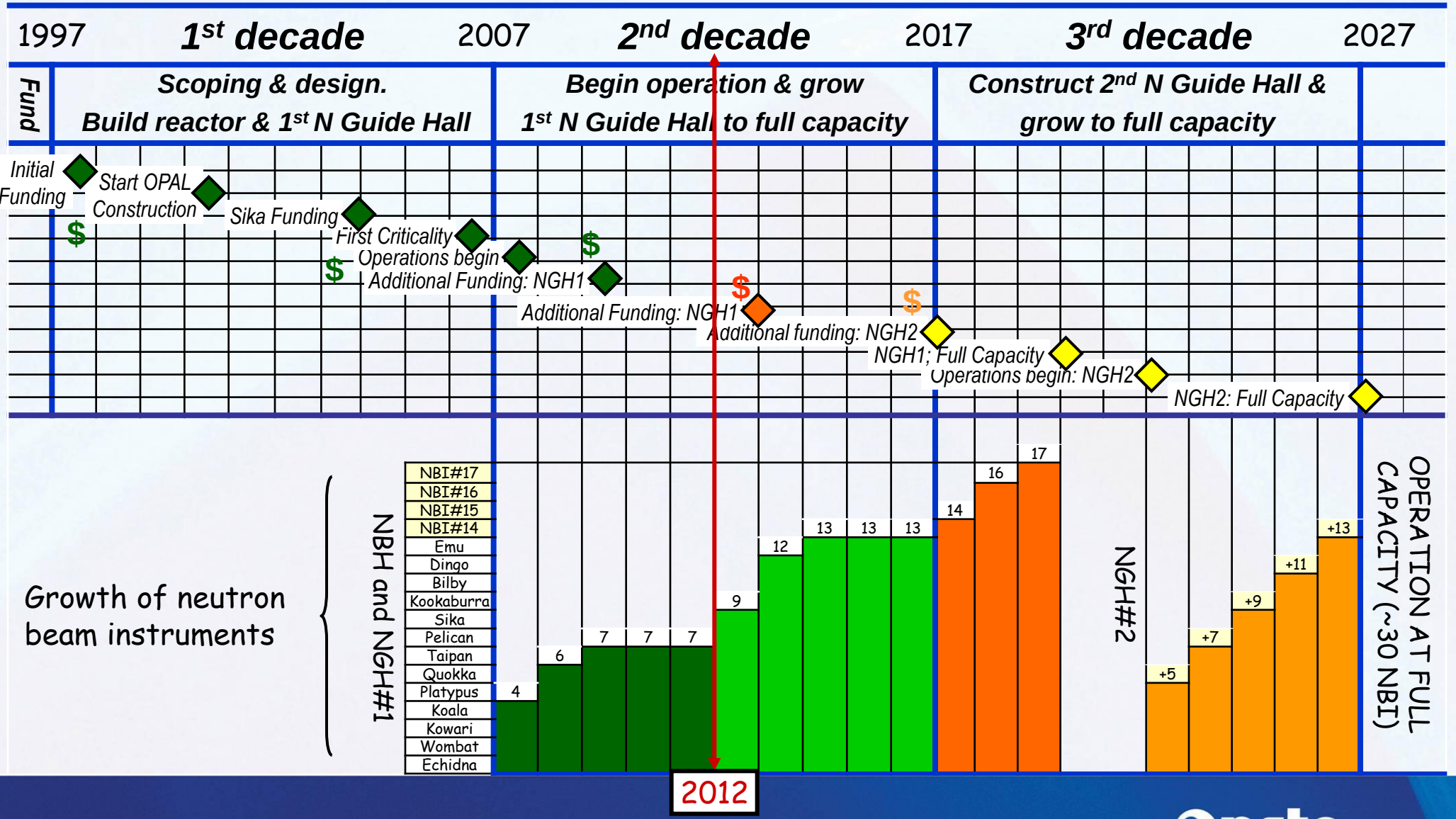
b. 1915

Ref: European Spallation Source (ESS) report (ENSA, 1997)

Goals for Neutron Science at the ***Opal*** Reactor

- To run as national and international scientific user facility
- Designed to compete with the world's top research reactors.
- Our beam instruments to be at the level of 'best-in class'
- Bragg Institute to rank in the top 3 neutron science facilities

Milestones of the OPAL Neutron Beam Facility



Opal's current/funded suite of neutron beam instruments

Diffraction

Echidna
high resolution powder

Wombat
high intensity powder

Kowari
residual stress

Koala
single crystals

Inelastic scattering

Taipan
thermal triple axis

Pelican
Cold time-of-flight

Sika
cold triple axis

Emu
backscattering

Large scale structures

Quokka
Pinhole SANS

Platypus
reflectometry

Kookaburra
ultra-SANS

Bilby
2nd pinhole SANS

Imaging

Dingo
radiography

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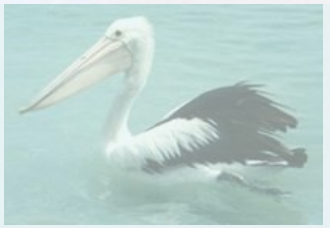
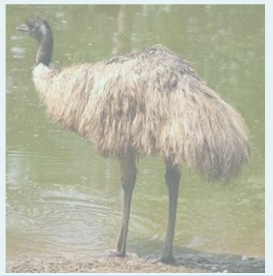


Sika
cold triple axis

Emu
backscattering



Large scale structures

Quokka
Pinhole SANS

Platypus
reflectometry

Kookaburra
ultra-SANS

Bilby
2nd pinholeSANS

Imaging

Dingo
radiography

Operation of the Opal Neutron Beam Facility:

The Bragg Institute operates the neutron science facility at OPAL:
with ~65 operations staff ~45 project staff + post-docs & students.

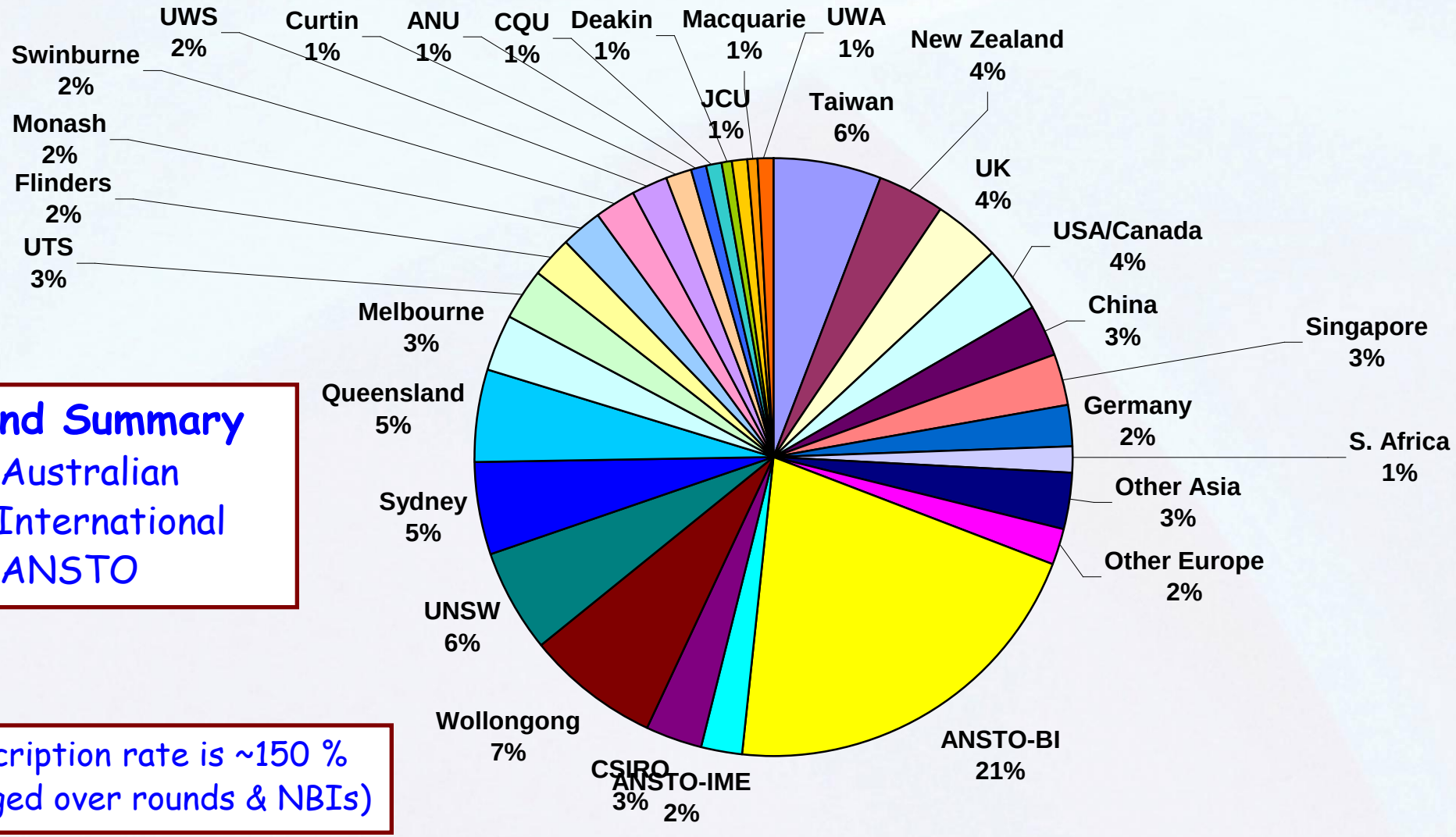
Access to facility is open to all through web based proposal scheme

Proposals assessed on scientific merit:

- regular proposals at six months intervals (Mar & Sept)
- programs of research for power users (3 year awards)
- mail-in fast-track service for simple expts.
- director's discretionary time (≤ 10%)
  - highly competitive research, essential programmes,…

Non proprietary research: *co-authorship or acknowledgement of ANSTO/Bragg Institute*
Proprietary research: *commercial rates apply*

OPAL Scientific demand: September 2011 (8th proposal round)



Demand Summary

46 % Australian

31 % International

23 % ANSTO

Subscription rate is ~150 %
(averaged over rounds & NBIs)

Research Highlights:
6 Magazine Covers in last 2 months

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Origin of Refereed journal papers produced from OPAL instruments (by institution first author)

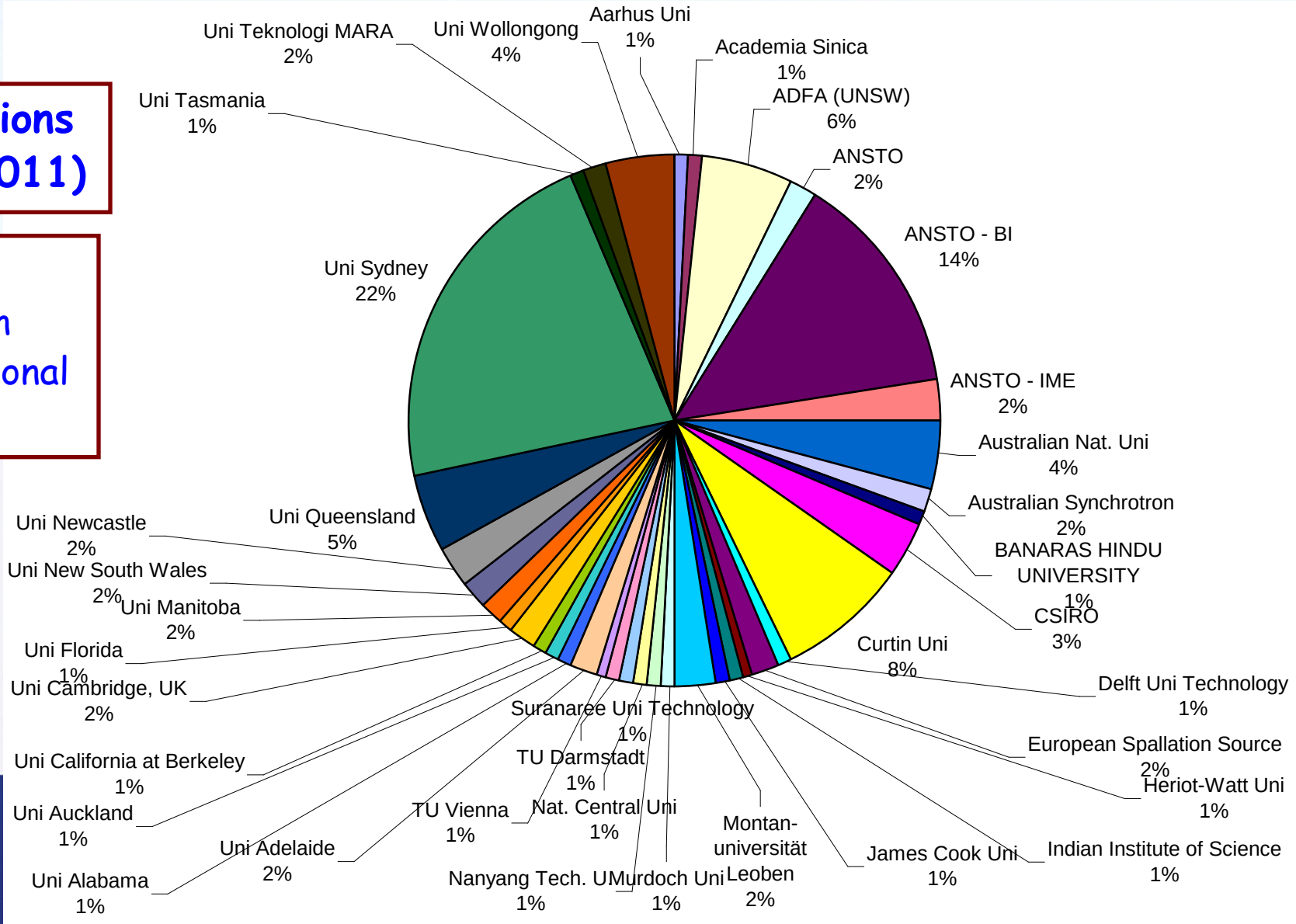
125 Publications (November 2011)

Summary:

61 % Australian

22 % International

17 % ANSTO



14 November 2011
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Prospects and Challenges

Achievements so far & current status

Our progress to date has been good (OPAL is in the top level for the region).

Could it have been better? Yes, if more funds were available.

We had momentum, lost some, & have it again.

Prospects for the future

We are now well established & are building toward our stretch goal.

The "Neutron Science" industry, particularly in Asia-Oceania is growing strongly.

Community demand continues to exceed supply.

Challenges ahead

Money, money, money. (need more OPEX +$10M per NBI + $100M per NGH)

Demonstrate (consistently) our value in rapidly changing world of Sci. & Tech.

Compete with other modern science tools (Xrays, Electrons, light, Spallation neutrons)

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