The Australian Synchrotron

Andrew Peele
Director
The Australian Synchrotron
What is the Australian Synchrotron?

- Faster
- More sensitive
- More resolution
- Tunable
- More Power
What is the Australian Synchrotron?
All facilities are oversubscribed. The success rate for applications is about 60%. About right for competition to breed excellence.

**Merit beamtime (80%)**
- Free of charge to users
- Travel and accommodation paid
- Expectation to publish

**Facility time (20%)** including:

**Commercial access**
- Paid by the hour at subsidised rate
- Confidentiality assured

Three application rounds per year. Operates 24/7 (apart from maintenance periods)

Access is peer reviewed based on merit consistent with international best-practice:

- Quality of the Proposal (40%)
- National Benefit + Applications (30%)
- Track Record (30%)
- The need for Synchrotron Radiation.

All facilities are oversubscribed.
How we do it

- Operational Experience
- People and partnerships
- Infrastructure (incl. computational)

Innovation & Productivity
Remarkable beam availability track record

Availability, scheduled and delivered hours per year

- **Scheduled**
- **Delivered**
- **Availability**

<table>
<thead>
<tr>
<th>Year</th>
<th>Hours</th>
<th>Scheduled Availability</th>
<th>Delivered Availability</th>
<th>Availability (%)</th>
</tr>
</thead>
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<td>2300</td>
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<td>99.92</td>
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</tbody>
</table>

**Record**

High 16 week availability
University Access

Value of Merit Shifts Delivered
8 hour Merit Shifts Delivered by Year

Year

Value of Merit Shifts Delivered
$0.00 $5,000,000.00 $10,000,000.00 $15,000,000.00 $20,000,000.00 $25,000,000.00 $30,000,000.00

Other Universities

University Use
Worth over $120M

68%
Percent share of beamtime by University

35 Universities Accessed in the last few years

Go8
IRU
ATN
RUN
Other
Refereed Journal Publications

500+ Publications p.a.

~80% Universities
Melbourne scientists have academically discovered how to transform molecules into a new type of crystal—a potential breakthrough for next-generation drug developments—using the world’s most powerful X-ray emitting light 10 billion times brighter than the sun.

The work, led by Associate Professor Brian Abbey at La Trobe University, has overturned more than a century of accepted thinking in crystallography, the science of determining the arrangement of atoms in solids.

"Currently, crystallography is the tool used by biologists and immunologists to probe the inner workings of proteins and molecules, it’s a fantastic tool of life," Prof Abbey said.

"Being able to produce these structures in new ways will help us to understand the function of our drugs, which may open new avenues for drug development.

The research is an important step in collaboration with the International Crystallography Network.
Benefit to Industry

- Through research programs
- > 200 companies interacting with University and research institutions
- Access to researchers
- Access to Grant funding
- Access to facilities
- Internal Beamline-Industry Group

![Diagram showing the distribution of commercial activities](image.png)
### Real-Life Benefits

<table>
<thead>
<tr>
<th>De-clogging Ink-jet printer heads for MemJet</th>
<th>Venetoclax approved by FDA to combat CLL</th>
<th>Materials for improved solar cell efficiency</th>
<th>Gold in Gum Leaves</th>
<th>Facilitating approval of generic oncology medication for Hospira</th>
<th>Testing safety of zinc nanoparticles in sunscreen</th>
<th>Strengthening Sheep Leather</th>
</tr>
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<tbody>
<tr>
<td>Over 1,284 protein structures solved</td>
<td>Over 2,800 peer reviewed papers</td>
<td>Over 620 student theses</td>
<td>Cultural Heritage – finding hidden artworks</td>
<td>Iron enriched rice variants</td>
<td>Zeobond green cement</td>
<td>Stainless magnesium</td>
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</table>
BRIGHT
New Beamlines

- Medium Energy XAS
- Advanced diffraction and scattering
- X-ray fluorescence nanoprobe
- Micro-CT
- BioSAXS
- MX3
- Micro materials characterisation
New beam lines – Meet demand, fill gaps

**Geosciences**
- High energy
- 3D Imaging

**Health / Medical**
- High throughput protein structure
- Small crystal capacity

**Advanced materials**
- Residual stress analysis
- Combined spectroscopy, diffraction and imaging
New beam lines – Outcomes

- Geosciences
  - Better use of resources

- Health / Medical
  - Better drugs

- Advanced materials
  - Better materials
Data

Antony van der Ent, Hugh Harris, Martin de Jonge, Peter Erskine, Rachel Mak, Jolanta Mesjasz-Przybylowicz, Wojciech Przybylowicz, Emmanuelle Montargès-Pelletier, Alban Barnabas, Guillaume Echevarria, David Paterson and Daryl Howard

University of Adelaide
Australian Synchrotron