

PHYSICS AS AN INTERNATIONAL ENDEAVOUR

Physics is a fundamental enabling science that not only gives us insight into the workings of nature, but also provides knowledge that can be applied to the economy and to benefit society.

Physics probes the very large, for example by using telescopes to explore the Universe. It also probes the very small to study the basic building blocks of matter using giant particle accelerators. In between these two extremes, physics has been applied to revolutionise our world. Examples include medical imaging and therapy, optical communications, energy generation, and modern electronics, computers and the internet.

In all these endeavours, the scale and extent of physics research means that international collaborations play an ever-increasing role, bringing together physicists and their facilities in many countries, and pooling ideas. Some questions facing physics today can only be answered by 'big science', which requires the sharing of very large, sophisticated instruments. Other questions can be tackled by individual teams and experimental facilities, who need to engage with the international community of physicists to test evidence, cross-fertilise ideas and transfer technology.

WHERE DOES AUSTRALIAN PHYSICS STAND?

To leverage and benefit from the rest of the world's cutting edge research, Australia needs to be recognised as a significant contributor internationally alongside countries of similar standing. Over the years, a high level of international collaboration has enabled Australian physicists to capitalise on investments made in existing research infrastructure, which is often beyond the means of any single nation to build and maintain.

Australian physics plays important roles in 'big science' — including the ATLAS experiment at the CERN Large Hadron Collider, the International Thermonuclear Experimental Reactor (ITER) and the Laser Interferometer Gravitational-wave Observatory (LIGO). Australia also has major physics facilities — like the Square Kilometre Array (SKA) and other large astronomy facilities, the Australian Synchrotron and the Australian National University Heavy Ion Accelerator Facility. All are used by overseas physicists, thereby providing Australia with a seat at the international table.

Australia's international profile, and its contribution to physics research in smaller-scale laboratories, is also outstanding. This is evidenced by the award of Australian Research Council Centres of Excellence in frontier physics: quantum computing, X-ray science, photonics, quantum-atom optics and engineered quantum systems.

HOW CAN AUSTRALIAN PHYSICS STAY AT THE LEADING EDGE?

In order for Australia to benefit from leveraging international physics research, we need to continue to contribute at the forefront of modern physics. A key requirement is sustained mechanisms to enable Australian physicists to collaborate internationally.

To achieve this, ongoing government support is necessary to establish and maintain research relationships with leading international research organisations and nations, and to build relationships with emerging nations. Collaboration within the Asia-Pacific region is increasingly important. Of particular significance is collaboration with China and India, as Australian physics research complements the technological needs, strengths and capacity of these nations.

In order for Australian physics to benefit from strong engagement with international research, we need to:

- ▶ Replace the defunded International Science Linkages scheme, to access major international facilities and funding schemes such as the EU Framework Programs
- ▶ Establish co-funding agreements with international grant agencies, to allow Australian researchers to be partners in major international collaborations
- ▶ Replace the International Researcher Exchange Scheme, to promote two-way exchange at the individual researcher level, essential for rapidly developing fields
- ▶ Ensure that Australian physicists can contribute to international panels and agencies that develop international policy.

**ONLY BY BEING
RECOGNISED AS
A PLAYER AT THE
LEADING EDGE, AND
BY SUPPORTING STRONG
INTERNATIONAL LINKS,
CAN AUSTRALIAN PHYSICS
CONTINUE TO LEVERAGE
INTERNATIONAL
RESEARCH FOR THE
BENEFIT OF OUR
SOCIETY**

The National Committee for Physics is a committee of the Council of the Australian Academy of Science. The broad aims of the committee are to foster physics in Australia, to link the Academy to Australian physicists and relevant scientific societies, and to serve as a link between Australian and overseas physicists, primarily through the International Union for Pure and Applied Physics and the International Commission for Optics.

The Council of the Australian Academy of Science biennially seeks the advice of the National Committee for Physics, in consultation with the National Committee for Chemistry, on the award of the Geoffrey Frew Fellowship. Fellowships are awarded to distinguished overseas scientists to participate in the biennial Australasian Conference on Optics, Lasers and Spectroscopy and to visit scientific centres in Australia.



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**INTERNATIONAL
COLLABORATION
IN PHYSICS**