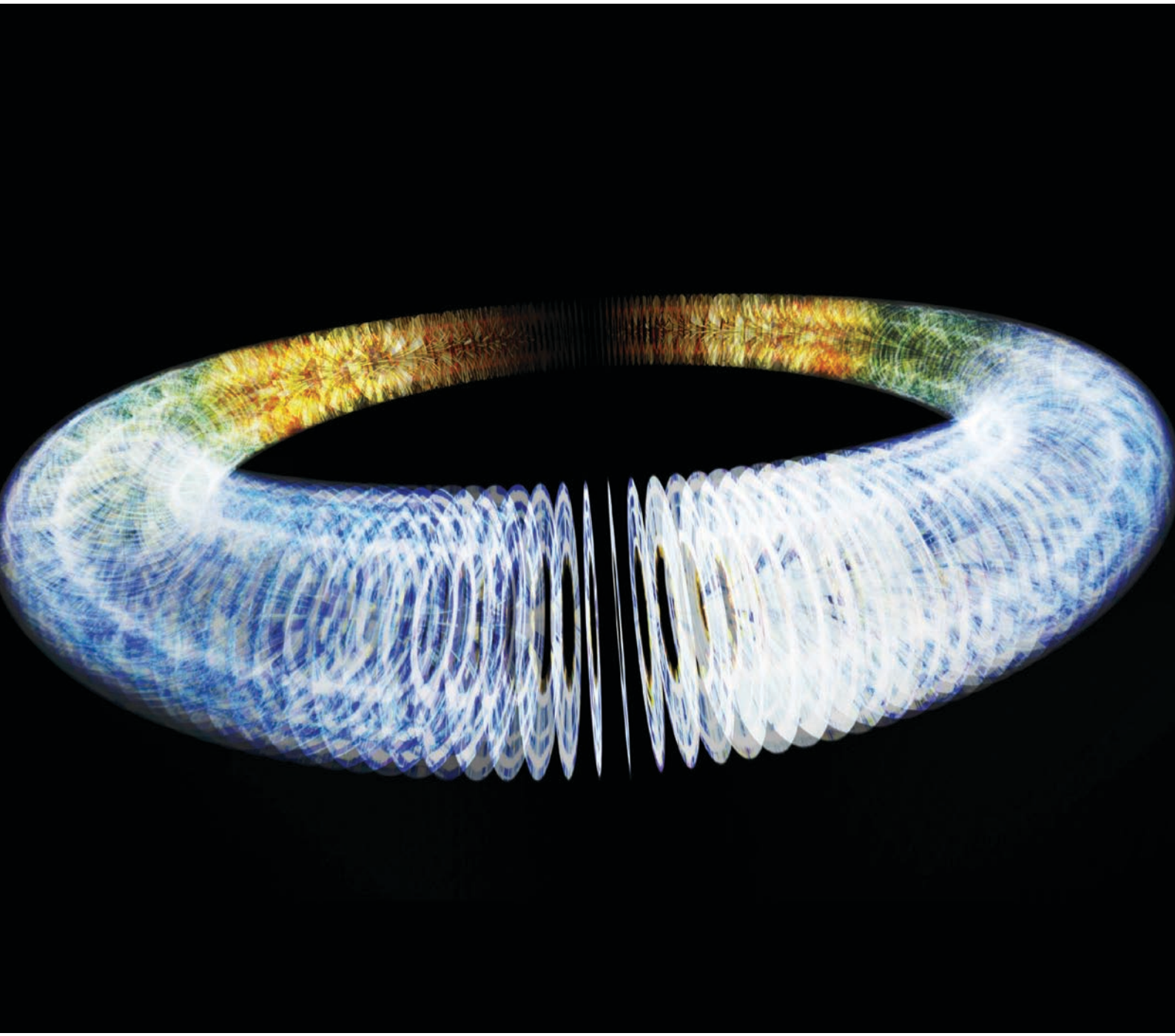


ACAS

Australian Collaboration for Accelerator Science

Australian Synchrotron

ansto

The University of Melbourne

ANU The Australian National University

Cover image courtesy of Chris Henschke

CREATING
NATIONAL AND
INTERNATIONAL

OPPORT

Creating national and international opportunities

Accelerator science is both a discipline in its own right within modern physics and provides highly powerful tools for discovery and innovation in many other fields of scientific research.

As such, it holds a distinguished position in enabling and shaping the modern world from the discovery and study of the atomic properties of materials, to biomedical research and the treatment of illnesses, unravelling environmental processes and finally to the fundamental understanding of how the Universe was created.

Throughout its history Australia has participated and made key contributions to the field of accelerator science, including the invention of the synchrotron acceleration principle.

To maintain and develop state of the art accelerator based facilities in Australia, the Australian Collaboration for Accelerator Science (ACAS) has been established.

Aims of ACAS

Contribute to accelerator science for the next generation

The primary aim of ACAS is to provide a platform for contributions to accelerator science research efforts and develop the next generation machines for future light sources, ion beams and microprobes, medical accelerators, as well as high energy particle physics. ACAS will harness the expertise of the researchers in the collaboration to advance Australia's National Research Priorities through state-of-the-art accelerator based sciences at the government and university research facilities. ACAS is a strategic network that will deliver scientific research within the accelerator science field and to the broader user community.

Generate strong teaching links to teach and nurture students

Student engagement underpins in many ways the research goals of the accelerator science collaboration and as such ACAS will aim to nurture talent in the field. Traditionally accelerator scientists have come from the nuclear and particle physics communities, but with the recent investment in accelerator based science, ACAS will develop accelerator physics teaching programs in collaboration with universities. A natural partner in such a teaching plan lies in the high energy physics community which is already involved in many cutting edge research efforts using the world's largest and most advanced accelerators.

UNITIES

Deploy latest e-science technology to all labs

One area of complete overlap for all national accelerator facilities is the need for the latest e-science tools. These tools currently include the computing hardware to run the machines but they need to be extended to data access and storage, computing power for analysis and modelling, simulation software access, computing grid technology and remote access and communication. This technology has been developed and deployed to varying degrees at the accelerator facilities for the user community, however ACAS aims to coordinate the effort to make these state-of-the-art tools available to the accelerator physics community to benefit their research efforts.

Ongoing development of state-of-the-art Australian facilities

ACAS is a national, cohesive and representative collaboration which aims to operate and maintain Australia's current accelerator facilities at world-class levels. This includes the ongoing development of all Australian facilities, through government funding, to keep up with worldwide progress. The government, university and industry partners in the collaboration will work with research scientists to articulate how funding should be targeted to best meet the research priorities and develop the necessary capabilities in accelerator science.

Why ACAS was established

Deliver university based education and student projects

Presently there are a small number of university based courses that lightly touch on the topic of accelerator science, mostly from the point of view of a user. ACAS will enable the development of dedicated accelerator science subjects directly aimed to a Masters course in accelerator physics. Students are already able to conduct projects at accelerator facilities with staff acting as co-supervisors with university based academic supervisors. The appointment of joint academic positions linked to the accelerator collaboration will further strengthen the link to students, and through the research projects and teaching increase the publication rate and the academically measurable research output.

Keep Australia up-to-date in accelerator science

Accelerator science is heavily reliant on a broad range of user communities from many areas of science. It cannot be overstated how broad the range of scientific fields that use accelerators is, from mineral exploration to drug development, forensics to food technology and archaeology to cell biology to name just a few. The quality of the accelerator facilities available to Australian scientists must be maintained at a high standard to provide the research environment necessary for scientific discovery in all fields. In order to achieve this, it is necessary to be involved in the world accelerator community at the collaborative research program level.

Through ACAS's planning and facilitation, staff scientists, academic research partners as well as undergraduate and research students will have access to the best laboratories through international collaborations, schools, conferences, workshops and equipment. ACAS will provide the opportunity for the accelerator science community to conduct the research and training activities necessary to develop accelerator facilities for synchrotron science, fundamental nuclear physics, nuclear microprobe for materials, mass spectrometry, nuclear medicine, radiation dosimetry and calibration standards. This nationally coordinated framework will also nurture and inspire the next generation of scientist to work in the field of accelerator science and design the accelerators of the future.

Direct funding into high priority research

Many centres have been formed in Australia that are geared to scientists who use accelerators to conduct their research, thereby attracting funding and improving the science output from those fields. With this new national collaboration, funding will now be attracted to accelerator science which underpins the other National Research Priorities. In this manner funding could be targeted at the highest priority research areas and the community's efforts strategically focussed.

Capitalise on investment in accelerator based user facilities

In the past decade a significant investment has been made in accelerator based science in Australia. A new synchrotron light source, the Australian Synchrotron, has been built, one of the largest single investments in Australian science in decades, new medical accelerators have been commissioned at government agencies and hospitals and world-class university based ion accelerators have been upgraded and improved. As a result, it was recognised that it is in Australia's strategic interest to continue to maintain and develop accelerator based science facilities for the broad base of current and future users.

Until now accelerator scientists have collaborated informally to keep up-to-date with developments across the country. ACAS will keep abreast of the needs of the accelerator community and formulate strategies for resource planning, not just in terms of capital expenditure, but to ensure that Australia has the teaching and skills development necessary to run national laboratories into the future.

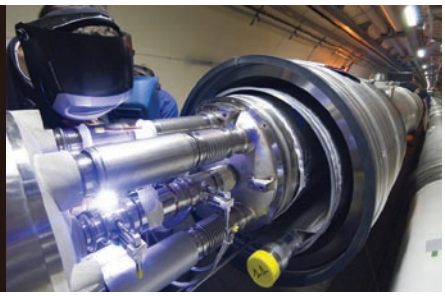
Foster collaborative research to maintain facilities

Taking into account the breadth of accelerator science conducted in Australia it makes strategic sense to collaborate strongly in all the overlapping areas of research and development across all the national accelerator facilities. ACAS will foster these collaborations and identify areas where skills from other facilities can be deployed to improve research capabilities and deliver projects to accelerator based science users.

Research to develop new facilities and innovative technology

Considerable intellectual effort has been made to build, operate and develop the accelerator facilities in Australia. ACAS will harness the demonstrated skills and capabilities required to conduct advanced accelerator science and ensure these skills are maintained and developed through to the next generation of scientists. Challenges still exist for the Australian accelerator facilities to continue to provide leading edge tools for the whole scientific community. In order to thoroughly tackle these challenges requires research by a dedicated group of professional scientists and students in government, academia and industry. As the user groups on the current accelerators gain more experience and extend the boundaries of what science can do, accelerator scientists will need to respond by developing new techniques and technologies. At present the required time spent on research compared to maintenance and development, needs to be increased to keep our accelerator facilities competitive. Research skills, computer modelling, equipment and students can be delivered to the accelerator science community through a national collaboration that harnesses the strong links already in place. It will also provide a direct funding channel that can drive accelerator science, rather than relying on trickle-down funding through user programs.





Accelerator science education

To achieve ACAS's aims, universities will be encouraged and supported to increase the courses on accelerator physics that are available to students. ACAS will sponsor and coordinate dedicated accelerator schools during non-teaching periods at universities to supplement the more general aspects of accelerators covered in existing course work. In the future, the aim is to offer a Masters of Accelerator Science that will form the basis of a career at one of the national accelerator facilities, hospitals or in industry.

The main contributors to the teaching of accelerator science are the physics departments at the following universities:

- The University of Melbourne, Experimental Particle Physics Group
- The University of Sydney, High Energy Physics Group,
- The Australian National University, Department of Nuclear Physics,
- Monash University, School of Physics, and
- University of Wollongong, Centre for Medical Radiation Physics.

In addition, through international collaborations there is access to overseas teaching at the following schools held several times each year on selected topics:

- US Particle Accelerator Schools, and
- CERN Accelerator Schools and Summer Studentships.

This is not an exhaustive list of teaching opportunities and the list will expand as the synchrotron science and other accelerator based communities grow around the nation.

Each of the ACAS members currently run a number of education and training programs for students. Programs run by each organisation include:

ANSTO

- Runs accelerator science schools in conjunction with Melbourne University and the Australian Synchrotron
- Supervises post-graduate students
- Provides lectures for under graduate programs at various universities across Australia.

ANU

- Offers a Masters of Nuclear Science course
- Provides nuclear physics courses for under-graduate students
- Runs a summer scholar program for Australian and New Zealand students.

Australian Synchrotron

- Runs accelerator science schools
- Manages under-graduate laboratory projects
- Supervises PHD, masters and under-graduate students
- Facilitates attendance at CERN summer schools.

Melbourne University

- Runs accelerator science schools
- Offers a high school outreach program
- Holds university open days
- Provides a PHD student program
- Runs under graduate lectures
- Offers laboratory classes
- Hosts STARS - Students & Teachers Accessing Research Scientists - Science school for year 11 students across the country.

Key ACAS people

Dr. Roger Rassool

Director of ACAS, School of Physics, University of Melbourne

Dr. Mark Boland

Deputy Director ACAS, Principal Scientist, Accelerator Physics, Australian Synchrotron

Prof. John Dodson

Head of the Environmental Research Institute, ANSTO

Dr. Nikolai Lobanov

Accelerator Research and Operations Manager, Department of Nuclear Physics, ANU

Dr. Adi Paterson

Chief Executive Officer, ANSTO

Prof. David Hinde

Head of Department, Department of Nuclear Physics, ANU

Prof. Geoffrey Taylor

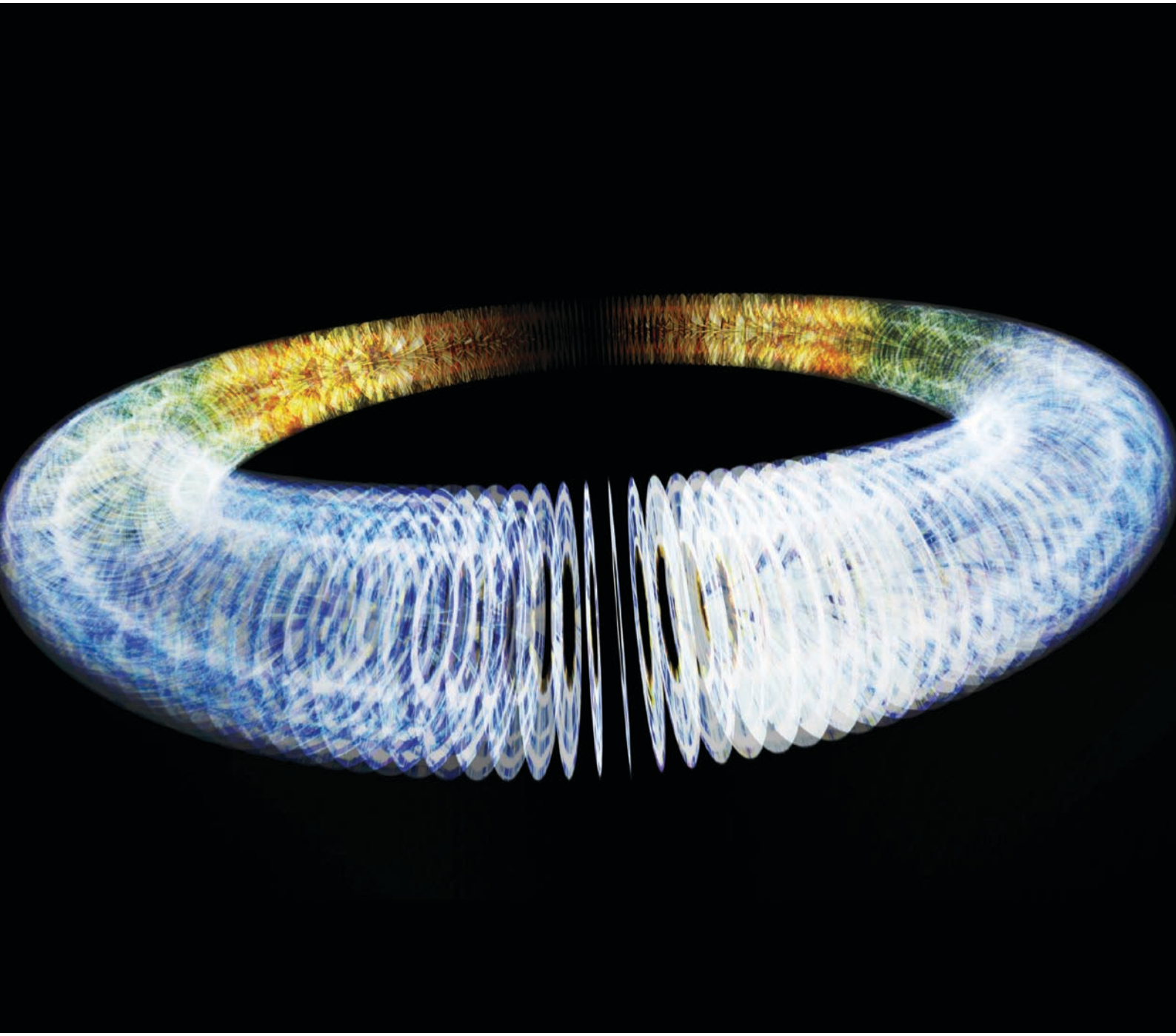
Australian Professorial Fellow, University of Melbourne

Mr. Greg Le Blanc

Head of Accelerator Science and Operations, Australian Synchrotron

Dr David Cohen

Senior Principal Research Scientist ANSTO



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