Australian Government
Australian Research Council

ARC

NATIONAL QUANTUM STRATEGY 2022
ARC Submission

Introduction

The Australian Research Council (ARC) welcomes the opportunity to provide a submission to the National Quantum Strategy (the Strategy). This submission provides an overview of the ARC's funding schemes and how they support the objectives of the Strategy. It also gives a historical summary of ARC-funded research activity relating to the quantum field.

The ARC is a entity within the Australian Government that funds research and researchers under the National Competitive Grants Program (NCGP). The ARC makes an important contribution to the Australian Government's $3.7 billion yearly investment in Australian university research, awarding around $850 million of competitive grants each year. The NCGP comprises a range of complementary schemes under the Discovery Program and Linkage Program to support researchers at different career stages, build Australia's research capability, expand and enhance research networks and collaborations, and develop hubs and centres of research excellence.

The ARC has supported quantum research since the beginnings of the field in the late 1990s. In total since 2002, the ARC has provided over $194 million to projects coded just to the "quantum physics" field of research and around $600 million to all projects that included quantum related research (see table overleaf).

<u>Objective 1 – Create a thriving environment for development, commercialisation and use of quantum technologies</u>

ARC Comment

The schemes administered by the ARC in its Linkage Program promote the formation and development of alliances between researchers and industry (and other research end-users), and in doing so support the translation, adoption and diffusion of research knowledge, skills and ideas.

The ARC's Linkage Program, together with other government-administered industry-research programs provide a range of funding support for researchers, industry and government to partner in the development and commercialisation of research and technology.

It is important to maintain strong co-ordination, complementarity and synergy across government initiatives to strengthen the research translation and commercialisation pipeline in quantum technologies that will underpin a thriving Australian quantum industry.

Objective 3 – Enhance Australia's global leadership in quantum research

ARC Comment

Quantum research, like other fields, is a long-term investment that requires robust support across all stages of research. The ARC's Discovery Program is aimed primarily at the conduct of fundamental research by individuals and teams. Many of Australia's quantum researchers have received support under Discovery Program for their research.

For example, Professor Michelle Simmons, who currently leads a team of world-leading researchers, students, and professional staff as the Director of the ARC-funded Centre of Excellence for Quantum Computation and Communication Technology, was awarded an ARC Queen Elizabeth II Fellowship in 1999 and whose research has been continuously supported by the ARC since then.

Sustained investment in fundamental research is a critical foundation to the entire innovation system. Curiosity-driven research leads both to unexpected discoveries with almost immediate application, as well as providing the vibrant research base on which further applied research depends.

Objective 4 – Drive skilled workforce growth to scale industry and make Australia the top destination for quantum technology talent

ARC Comment

The development of excellent researchers with skills in fundamental and applied research, and in research collaboration, translation and commercialisation is an important element to developing Australia's quantum industry.

The ARC's NCGP schemes provide pathways of opportunities for researchers to build the scope and scale of their work. Across the NCGP – and particularly the Fellowships schemes in Discovery and Linkage Programs – targeted opportunities are provided to support research training, early career researchers, mid-career researchers and world leading researchers.

A thriving quantum industry will benefit from the ARC's continued support for researchers both in university and industry settings as they progress through these career stages.

Objective 7 – Build trust, ensure inclusivity and balance national interests

ARC Comment

The ARC agrees that as quantum technology progresses it will be important for government to consider the intersection between technology development and the public good, including social, ethical and security challenges. The ARC is well-placed to contribute to these discussions due to our expertise in providing high-quality grant administration and research policy advice. Providing these services requires us to regularly consider and manage these challenges while maximising research benefits to Australian society.

ARC funding to quantum-related research

Funding type and name of Scheme	ARC Funding to quantum physics*, 2002-2022	ARC Funding to all quantum-related research+, 2002-2022
Discovery Program		
Funding to individuals undertaking excellent, internationally competitive basic and fundamental research (all Discovery Program ARC research fellowships) • Early-career researchers – Discovery Early Career Researcher Award • Mid-career researchers – Future Fellowships • Senior and world-leading researchers – Australian Laureate Fellowships • Also includes Federation Fellowships (2002-2007)	$57,669,144 to 83 fellows	$167,245,008 to 214 fellows
Funding to individuals and teams undertaking excellent, internationally competitive basic and fundamental research • Discovery Projects	$38,795,696 to 90 projects	$235,048,372 to 589 projects
Funding to Aboriginal and/or Torres Strait Islander individual researchers and teams undertaking excellent, internationally competitive basic and fundamental research • Discovery Indigenous	Nil	Nil
Linkage Program		
Small- to medium-scale research projects • Linkage Projects	$3,742,368 to 8 projects	$17,898,305 to 42 projects
Medium-scale research programs and entities • Industrial Transformation Research Hubs • Industrial Transformation Training Centres	Nil	Nil
Large-scale 'critical mass' research programs and entities • Centres of Excellence	$90,100,000 to 3 Centres	$179,450,000 to 7 Centres
Collaborative research infrastructure • Linkage Infrastructure, Equipment and Facilities	$4,107,564 to 7 grants	$34,438,043 to 63 grants
Research fellowships • Early-Career Industry Fellowship • Mid-Career Industry Fellowship • Laureate Industry Fellowship	N/A – first rounds close to applications in 2023	N/A – first rounds close to applications in 2023

* ARC grants awarded to Field of Research Code 0206

+ ARC grants with 'quantum' in the project description or title and which were related to research in the quantum realm.