

SINGAPORE NATIONAL ACADEMY OF SCIENCE YOUNG SCIENTIST AWARDS 2021

PHYSICAL, INFORMATION & ENGINEERING SCIENCES CATEGORY

Dr Yvonne Gao

Presidential Young Professor, Department of Physics,
National University of Singapore
Principal Investigator, Centre for Quantum Technologies,
National University of Singapore

“For her work on developing the key hardware building blocks for quantum computers”

Dr Gao's research focuses on building a hardware that is both scalable and robust to realise a practical quantum computer. In particular, she works on constructing modular hardware building blocks, such as engineering novel device architectures and programmable logical operations between protected quantum bits of information.

The elements Dr Gao has developed are critical for scaling up quantum devices while effectively preserving their performance. In her PhD work, she performed the first experimental demonstration of a universal entangling operations between multi-photon quantum elements. These have led to several high-profile publications in some of the best international journals such as Science and Nature. Her work has also resulted in two patents, both of which have been licensed in a Yale spin-off based in the United States. They form the technical cornerstone for their effort in commercialising quantum computers.

Dr Gao joined NUS as a Presidential Young Professor and a Principal Investigator in the Centre for Quantum Technologies in 2020 to develop the circuit quantum electrodynamics technology in Singapore. The research and technical capabilities of Dr Gao's team provide a rich and versatile avenue for collaborative studies, both in the fundamental investigations of quantum physics and in developing full-stack quantum computing technologies.

Dr Gao is also mentoring the next generation of young scientists, with public talks, popular science writing, and school outreach activities. Her research team strives to create opportunities for high-school students to gain experience in research, to inspire them to further pursue their interest in Science, Technology, Engineering and Mathematics. Dr Gao believes that educating and empowering young science enthusiasts is essential to create a sustainable ecosystem for developing cutting-edge technologies.

Dr Gao is a recipient of the 2000 National Research Foundation Fellowship, and has been

recognised as a MIT Tech Review, TR35 (Asia-Pacific) Innovator and one of Singapore Women's Weekly's Great Women of Our Times 2020. To date, she has a total of 14 peer-reviewed publications with a h-index of 12, including articles in Science, Nature, and Nature Communications, and 670 citations.