

# A quantum leap for chips

THE computer chips of today are almost 400 times smaller than those of the 1970s. That has squashed the distance electrical impulses have to travel and sped up processing speeds exponentially.

But there will come a time when the revolutionary microchip cannot get any smaller.

That has got researchers – like the head of the Centre for Quantum Technologies at the National University of Singapore (NUS), Professor Artur Ekert, 47 – looking towards the next generation of chips which

could one day tap the power of molecules and atoms to transmit signals.

The work might eventually play an integral role in building the world's first quantum computer.

"The computational power of this machine is potentially greater than anything we know today," said Prof Ekert. He was speaking at a symposium held at NUS to celebrate the centre's first anniversary on Tuesday.

Researchers there explore both the theoretical and practical possibilities of constructing devices based on quantum technology. Their work is based on quantum mechanics – the physics theory that explains how the world works at the basic level of atoms, molecules and photons.

The institute was awarded a \$150 million government grant last year.

Today's computers have a network of microchips and components known as transistors. The smaller these transistors are, the more that can be squeezed on a chip and the faster the chip operates.

Unlike today's silicon chip-based computers that transmit information in binary units (bits), quantum computers use the subatomic features of quantum physics to transmit information in quantum bits (qubits) that can exist in more than two states.

Their development, though, likely remains decades away.

Quantum technology has the potential to be far more powerful than today's technology in the storage of large amounts of information and can also be used to provide an unbreakable mechanism to code and decode information.

Dr Alain Aspect, 58, a quantum physicist at the French National Centre for Scientific Research, said the groundbreaking research conducted at the centre has already achieved world-renowned results. He was a guest speaker at the symposium.