

Scientists hope to create new generation of supercomputers

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The Government's main science funding agency, the Engineering and Physical Sciences Research Council (EPSRC), today awarded the University of Cambridge a grant of £4.4m for research which promises to revolutionise the speed of information technology and hopes also to discover new laws of physics. The grant funds research into some of the tiniest controllable structures in the world: nanostructures.

The University's Department of Physics Cavendish Laboratory wants to develop a new generation of tiny semiconductors – the main component of computer chips – which will be able to communicate information at speeds faster than ever before. The new super-fast machines will be called 'quantum computers' which would work on entirely different principles from the computers we know today.

Professor Michael Pepper, who is Principal Investigator on the four-year project and head of the Semiconductor Physics Group at the Cavendish, said: "We are not talking about speeding up reactions by a factor of two or three, but by a factor of billions! Currently computing operations happen in sequence. With the new technology they will happen in parallel."

Nanostructures are the tiniest particles known to man - one millionth of a millimetre. At this size particles follow the laws of quantum mechanics. The team will manipulate electrons and try to speed them up by changing the way they behave. This involves cooling them to near the lowest temperature possible in the universe: absolute zero (-273C).

The Cavendish Laboratory is one of the world's leading players in pioneering nanotechnology information. Professor Sir Michael Pepper was knighted in the recent New Year's Honours List. This honour comes only months after his receipt of the prestigious 2005 Royal Medal, also known as The Queen's Medal, for his work which "has had the highest level of influence and has resulted in the creation of the modern field of semiconductor nanostructures".

Other investigators in the team at the Cavendish Laboratory include Professor David Ritchie, Professor Charles Smith, Dr Crispin Barnes, Dr Chris Ford, Dr Geb Jones, and Dr Kalaricad Thomas, who are joined by Professor Michael Kelly in the Department of Engineering.

"The main applications for the new quantum computers will initially be enormous databases and security," said Professor Pepper. "Beyond that, quantum technology will impact on everyone's lives, but we are not yet sure how. This work will bring about a fusion of technology with the most fundamental theory of nature - the laws of quantum mechanics. We anticipate finding new types of behaviour in physics when dimensions become extremely small.

"It is hard to say just what the full implications of this work are, in a way that we did not understand the full impact of computers when scientists in Cambridge first worked on them in the 1940s. I hope that the research will contribute to new industries yet to be born."

Source: University of Cambridge

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