Innovative research brings quantum computers one step closer

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(PhysOrg.com) -- Complex computer encryption codes could be solved and new drug design developed significantly faster thanks to new research carried out by the University of Surrey.

The results bring the reality of a workable quantum computer one step closer, proving for the first time that it is possible to make these computers in silicon rather than a vacuum, which has been the focus of previous research.

Quantum computing has the potential to fix problems that would normally take millions of years to solve, much faster than ordinary computers. For these quantum computers to work, atoms need to be kept fixed in space, allowing them to move in an undisturbed oscillating wave motion. This atomic quantum wave holds much more information than a normal computer bit, meaning the computer logic and programmes needed to crack a code are more powerful, and therefore much faster.

Previous research has only succeeded in creating some building blocks for a quantum computer by using atoms suspended in a vacuum. However it has not been possible to make enough for a whole computer as scientists can only hold a limited number of atoms in place for a short period of time. Using atoms trapped in a silicon crystal, the research team, which also involved scientists from University College London and Heriot-Watt University, showed that the quantum waves oscillate long enough for a computer operation, and now hope to produce a higher number of computer bits.

"These results are a significant step forward in the development of quantum computing," commented research leader Professor Ben Murdin from the University of Surrey. "We hope that this work will open up a new field of physics, where quantum coherence can be explored in solid crystals, but at the same time we have brought a scalable silicon quantum computer a step nearer."

The researchers used the 'free electron laser' FELIX in the Netherlands to carry out the work which has been published in *Proceedings of the National Academy of Sciences of the USA*.

Provided by University of Surrey