Quantum information processing: A step closer

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Researchers from Yale, Surrey, and Paris have made an important breakthrough towards 'quantum information processing', which promises to lead to massive information technology advances in the future.

Quantum information allows for the ultimate information processing unit in terms of accuracy, distance of coverage, knowledge when eavesdropped, simplicity in design of parallel systems and potential bandwidth.

In the current issue of *Nature*, researchers have demonstrated a new approach for the manipulation of quantum states of light.

Photons need to interact with each other sufficiently strongly for this to be achieved. This was made possible by engineering a device where photons interact with each other even when only a few photons are present but at the same time the fragile quantum state is not destroyed by the environmental noise.

Dr. Eran Ginossar, one of the authors who conceived the idea, based at the Advanced Technology Institute (ATI) at the University of Surrey said: "What makes this discovery so exciting is that up to date it has been considered very difficult to engineer strong interactions between localised photons.

"This will open up a way of encoding quantum information directly to photons in one of the most promising architectures of quantum

computing".

Professor Ravi Silva, Director of the ATI, commented: "Previously envisaged bottlenecks to quantum information processing (QIP) over large areas and distances will now be enabled by this breakthrough.

"QIP is predicted to lead to enhance computing and communication even beyond the solutions to the spectrum crunch being resolved by the recently established 5G Innovation Centre at Surrey.

"It is a classic example of what is possible when theorists work closely with experimentalists, as in the case of the ATI and 5G Centres at Surrey. We hope to replicate the model in future doctoral training centres".

More information: www.nature.com/nature/journal/ … ull/nature11902.html

Provided by University of Surrey