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Physicists Achieve Breakthrough by Creating... Nothing?

Form of squeezed vacuum created

Some of you might think that creating a void is something easily achievable with today's technology, but the truth is far from reality. Not even the vacuum of space is completely empty. For example, vacuum is routinely used by physicists while undertaking studies related to quantum physics. But these vacuums are not perfect and can interfere severely with the results of the experiments. Even light leaves a trail after being completely turned off, thus introducing uncertainties in the measurement process.

Now, physicists from the University of Calgary say they have achieved the impossible, by creating a special vacuum through a technique involving the release and fast retrieval of a puff of gas. With the help of a crystal manipulated by laser light, 'squeezed vacuum' was obtained, a special vacuum that contains less parasite noise than that left behind by light.

The study which will be published tomorrow is the result of the work conducted by University of Calgary and Tokyo Institute of Technology scientists who realized that squeezed vacuum can be created and stored for a limited amount of time within the structure of a rubidium collection of atoms, and used when needed.

The need for squeezed vacuums became obvious when a team of researchers from the Harvard-Smithsonian Center succeeded in stopping light within a gas chamber. According to Alexander Lvovsky from the Department of Physics and Astronomy, Canada Research Chair, memory for light represents the next big step in quantum physics and may prove an extremely powerful tool in quantum computing and data securing techniques.

Alexander Kuzmmich from Georgia Institute of Technology, which nearly two years ago succeeded in storing and recovering a single photon, admits he is impressed by the achievements of University of Calgary researchers. Squeezed vacuum could prove to be essential for the creation of quantum networks and secure data transmissions.

Some forms of squeezed vacuum are already being used in instruments such as gravitational wave detectors and may also be employed in information carrying techniques or in the study of elusive quantum objects, such as entangled light. The international collaboration will most likely continue in the future its research in the field of light storage, entangled light and a broad range of applications in quantum computing.