

Scientist float levitation theory

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St Andrews scientists have discovered a new way of levitating tiny objects - paving the way for future applications in nanotechnology.

Theoretical physicists at the University of St Andrews (UK) have created 'incredible levitation effects' by engineering the force of nature which normally causes objects to stick together by quantum force. By reversing this phenomenon, known as 'Casimir force', the scientists hope to solve the problem of tiny objects sticking together in existing novel nanomachines.

Professor Ulf Leonhardt and Dr Thomas Philbin of the University's School of Physics & Astronomy believe that they can engineer the Casimir force of quantum physics to cause an object to repel rather than attract another in a vacuum.

Casimir force (discovered in 1948 and first measured in 1997) can be demonstrated in a gecko's ability to stick to a surface with just one toe. However, it can cause practical problems in nanotechnology, and ways of preventing tiny objects from sticking to each other is the source of much interest.

Professor Leonhardt explained, "The Casimir force is the ultimate cause of friction in the nano-world, in particular in some microelectromechanical systems. Such systems already play an important role - for example tiny mechanical devices which triggers a car airbag to inflate or those which power tiny 'lab on chip' devices used for drugs testing or chemical analysis. Micro or nano machines could run smoother

and with less or no friction at all if one can manipulate the force."

The pair have worked out how to turn the normally 'sticky' quantum force of empty space from attraction to repulsion using a specially developed lens placed between two objects.

"In order to reduce friction in the nanoworld, turning nature's stickiness into repulsion could be the ultimate remedy. Instead of sticking together, parts of micromachinery would levitate," said Professor Leonhardt.

Though it is possible in principle for humans to levitate, scientists are a long way off developing the technology for such feats.

"At the moment, in practice it is only going to be possible for micro-objects with the current technology, since this quantum force is small and acts only at short ranges. For now, human levitation remains the subject of cartoons, fairytales and tales of the paranormal," explained Professor Leonhardt.

The research is due to be published in the August edition of the *New Journal of Physics*.

Source: University of St Andrews

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