

Gravity eases its pull

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(PhysOrg.com) -- Ever since Galileo first dropped his balls off the top of the Tower of Pisa in the late 16th century, gravity has caused a major headache for mathematicians and physicists down the ages.

Throwing theorists' equations into chaos, it has proved a major stumbling block to the creation of a single 'theory of everything'.

But a new analysis by Dr David Toms, a theoretical physicist at Newcastle University, now shows that gravity may at least make some fundamental calculations more manageable.

He has found that gravity seems to calm the electromagnetic force at high energies. The finding could make some calculations easier, and is a rare case in which gravity seems to work in harmony with quantum mechanics, the theory of small particles. His full paper is published today in *Nature*.

Dr Toms explains: "The basic idea is that the value of the electric charge depends on how close you are to that charge.

"The number for the electric charge that you look up in the back of a textbook assumes that you are a very large distance - on the atomic scale - from the charge. The reason that the value changes with energy has to do with quantum mechanics.

"My research shows conclusively that charge is affected by gravity, and that it tends to make the charge weaker as you proceed to smaller distances. This is unexpected because in the complete absence of gravity the charge gets larger as the distance decreases."

In Dr Toms work, gravity seems to smoothe the interaction, making the force between the electron and photon nearly zero at high energies. This weakening of the force means that theorists can calculate the behaviour of high-energy electrons and photons after all.

"What [gravity](#) seems to do is make things better for you but there is still a lot of work to do", he warns.

More information: Nature paper online:

[www.nature.com/news/2010/10110 ... 1/news.2010.580.html](http://www.nature.com/news/2010/10110...1/news.2010.580.html)

Provided by Newcastle University

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