Ancient neutrinos could put string theory and quantum loop gravity to the test

October 13 2005

Tiny but ageing neutrinos can be used to test the very foundations of quantum theory at unprecedented cosmological time scales

Must the Schrodinger's Cat be fat enough for us to detect the possible phenomenon of gravity-driven collapse of the wave-function? In the 1950s, Feynman suggested that the infamous Schrodinger's Cat paradox would be resolved if gravity can be implicated for the collapse of the wave-function.

But, from Feynman in the 1950s to Penrose today, physicists have always taken for granted that one has to look for quantum superpositions of sufficiently macroscopic objects to detect such an effect due to gravity, since only the large mass of such macroscopic objects could distort the very fabric of space-time in accordance with Einstein's theory of gravity, thereby inducing the quantum mechanical wave-function to collapse.

In this paper, however, we prove that the idea of Feynman and Penrose can be tested more decisively by observing the *skinniest* objects in the universe---namely, the tiny neutrinos---provided they have been born just after the Big Bang. In other words, we show that such tiny but ageing neutrinos can be used to test the very foundations of quantum theory at unprecedented cosmological time scales.

Complete paper located at: arxiv.org/abs/quant-ph/0503001

Find more about **Schroedinger's Cat**:
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www.windows.ucar.edu/tour/link … e/scat.html&edu=high

Source: Perimeter Institute for Theoretical Physics