

# Is the Universe stuck in a Groundhog Day?

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The idea of a cyclical universe is controversial but a leading researcher believes we really could be stuck in a never-ending loop. Speaking at the Institute of Physics conference Physics 2005, Professor Paul Steinhardt presented new work which could reinvigorate research into future universes.

Scientists recently discovered that the Universe's expansion is speeding up, and that the majority of energy in the universe must therefore be gravitationally repulsive "dark energy". Professor Paul Steinhardt of Princeton University will explain how this could mean that the Universe is destined to repeat its own history.

Physicists propose several options for the future of the Universe, but most dramatic is the possibility that the current acceleration is the prelude to a period of contraction. The "big crunch" which followed would create new matter and radiation, triggering another big bang, and a rejuvenated Universe would emerge from the fireball like a phoenix from the flames.

Professor Steinhardt explained that what happens in the future could also have happened in our past. The big bang may not have been the beginning of space and time. Instead, the evolution of the universe could be cyclic, with regularly repeating periods of expansion and contraction.

If this theory is correct, it could help to explain one of the puzzles of cosmology – how the galaxies, stars and planets came into being. The big bang should leave a boring, featureless universe, but not if it was

preceded by a big crunch. The random quantum fluctuations in the collapsing universe might be the very ripples which seed the galaxies in the subsequent expansion.

The cyclic picture can be tested using experiments which are already underway. Physicists are looking for propagating ripples in space known as gravitational waves. Professor Steinhardt says that the spectrum of the waves detected should reveal whether or not the Universe existed before the big bang.

Source: Institute of Physics

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