

Astronomy Talk 10th July 2018

Quantum Gravity

Nick Evans is Professor of Theoretical High Energy Physics at Southampton University and the Director of the Faculty of Physical Science and Engineering Graduate School.

Quantum Gravity is the thorniest problem in modern theoretical physics. Nick explained how electromagnetism has led to a consistent quantum theory which is the best tested theory in science. Gravity, which at first sight appears very similar, leads to very strong interactions at high energy and everything breaks down.

Latest observations of gravitational waves confirm Einstein's general relativity which describes gravity as a "double copy" of electromagnetism. String theory is one possibility for how to make such a double copy and provides a quantum theory of gravity... But alas only in 10 space time dimensions. It throws up many strange ideas such as "brane-world" which simply emphasise the other big problem - we don't have any experimental probe of gravity at quantum distance scales.

In spite of this it seems real progress is being made and "holography" seems to be the best example of this. Convolved thinking about black holes has revealed string theory to really be a lower dimensional theory and this seems to be a general lesson about quantum gravity.

This talk was held in association with the Institute of Physics.