APPLIED MATHEMATICS COLLOQUIUM

Expanding Wave Solutions of Einstein's Equations which Induce an Anomalous Acceleration into the Standard Model of Cosmology

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Abstract:
In the early 1920's, astronomers came up with the Standard Model (SM) of cosmology, also called the FRW (Friedman-Robertson-Walker) spacetime. It was based on the Cosmological Principle: the universe is *homogeneous* (no preferred point), and *isotropic* (no preferred direction). In 1927, the American astronomer Edwin Hubble showed that the Universe is expanding: distant galaxies were receding from each other, and this confirmed the SM. In 1998, astronomers announced the astounding discovery that the Universe was actually accelerating. This discovery implied that the SM was incorrect, and thus had to be abandoned. In order to preserve both the FRW framework and the Cosmological Principle, astronomers came up with a model that modified the Einstein equations by adding on a term, the so-called "cosmological constant". This was **very** ad-hoc, (no physics behind it) and could be viewed as a "fudge factor". The cosmological constant leads to the concept of "Dark Energy", an un-observed, anti-gravitational force, generally accepted by the physics community. This talk will be concerned with my recent work with Blake Temple, (stemming from an idea of Temple), whereby we discovered a surprising new 1-parameter family of expanding wave solutions of the Einstein equations that contain the SM as a single point. This result leads to a mathematically rigorous possible explanation of the accelerating Universe, based only upon The Einstein Equations of General Relativity, without the need of Dark Energy. (An announcement of this work appeared in Proc.Nat.Acad.Sci.,August 25, 2009, Vol. 106, no. 34, pp 14213-14218.)

Monday April 12th 2010
4:30 PM
Building 2, Room 105

Refreshments are available in Building 2, Room 290
(Math Common Room) between 3:30 – 4:30 PM

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