

PHYSICS COLLOQUIUM

Matters of Gravity

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Abstract: There is sufficient amount of internal evidence in the nature of gravitational theories to indicate that gravity is an emergent phenomenon like, e.g, elasticity or fluid mechanics. Such an emergent nature is most apparent in the structure of gravitational dynamics. It is, however, possible to go beyond the field equations and study the space itself as emergent in a well-defined manner in (and possibly only in) the context of cosmology. The first part of the talk will describe various pieces of evidence which show that gravitational field equations are emergent. The second part will outline a novel way of studying cosmology in which the expansion of the universe is interpreted as equivalent to the emergence of space itself. In such an approach, the dynamics evolves towards a state of holographic equipartition, characterized by the equality of number of bulk and surface degrees of freedom in a region bounded by the Hubble radius. This principle correctly reproduces the standard evolution of a Friedmann universe. Further, (a) it demands the existence of an early inflationary phase as well as late time acceleration for its successful implementation and (b) allows us to link the value of late time cosmological constant to the e-folding factor during inflation.



About the speaker: Professor Padmanabhan, Distinguished Professor and Dean at IUCAA, Pune, is internationally renowned for his research contributions to the subjects of gravitation and cosmology. He provided a clear interpretation of gravity as an emergent phenomenon and showed that this paradigm extends to a wide class of gravitational theories including, but not limited to, Einstein's theory. This approach, which has far reaching implications for quantum gravity, has won prizes five times in the last decade from the Gravity Research Foundation, USA including the First Award in 2008. He has authored nine advanced level textbooks, acclaimed as magnificent achievements and used worldwide as standard references. He is currently the Chairman of the IUPAP Astrophysics Commission and was the President of the IAU Cosmology Commission and a Sackler Distinguished Astronomer of the Institute of Astronomy, Cambridge. He has received numerous national and international awards including the TWAS Prize in Physics, Infosys Prize in Physical Sciences and Shanti Swarup Bhatnagar Award. In recognition of his achievements, the President of India awarded him the medal of honour, Padma Shri, in 2007.

Venue: Physics Lecture Theatre

Time: 5:00-6:00 PM

Date: October 10, 2012

Tea at 4:45 PM



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INDIAN INSTITUTE OF TECHNOLOGY MADRAS