MINICURSO

Emergent Gravity

Raju Roychowdhury (USP, Brasil)

Abstract

An elucidation on the geometrization of electromagnetic force further leads to a proposal for a gravity theory (which we call emergent gravity) with non-symmetric metric. It will be shown why we believe that in noncommutative (NC) spacetime there always exists a coordinate transformation that locally eliminates electromagnetic force which is nothing but an upshot of Darboux theorem (precisely an analogue of equivalence principle) in symplectic geometry. The consequence is that electromagnetism can be realized as a geometrical property of spacetime like gravity. It will be discussed how emergent gravity reveals a beautiful generalized geometrical structure which is an artifact of the famous Seiberg-Witten equivalence between commutative and NC DBI actions and is reminiscent of the homological mirror symmetry. In emergent gravity the topology of spacetime is determined by the topology of NC $U(1)$ gauge fields. We will show that the topology change of spacetime is ample in emergent gravity and the subsequent resolution of spacetime singularity is possible in NC spacetime. Using ADHM construction we will show why emergent gravity provides a well-defined mechanism for the topology change of spacetime which does not suffer from any spacetime singularity in sharp contrast to general relativity.

Lecture 1. Fundamentals and Motivations with Mathematical Foundations - Lie Bracket, Courant Bracket, Generalized Geometry, etc.

Lecture 2. Tools for future - ADHM construction - a rapid introduction

Lecture 3. Physical application - Topology Change in emergent gravity and resolution of singularity

Dias: 31 de agosto (quarta-feira) a 02 de setembro de 2016
Horário: das 11 às 12 horas, todos os dias.
Local: Auditório do PPGFis