Title: Premetric teleparallel gravity as a framework for Lorentz and parity symmetries violation models

Author: Yakov Itin (Hebrew U. and JCT)

Abstract:

In general relativity (GR), the metric tensor of spacetime is an essential basic variable that represents the gravitational potential. In other gauge theories (such as electromagnetism), the so-called premetric approach succeeds in separating the purely topological field equation from the metric-dependent constitutive law. We show here how gravity can be embedded into the premetric framework. The teleparallel approach of gravity, which represents GR as a gauge theory based on the translation group emerges naturally in our construction. We formulate the metric-free topological field equation for two vector-valued differential 2-forms and a general linear constitutive law between these two basic field variables. The 6-th order constitutive tensor is irreducible decomposed into two (anisotropic) principal parts, two axion and two skewon (dissipative) parts. The requirement of local Lorentz invariance turns the model into a full equivalent of GR. Our approach opens a way for a natural extension of GR to diverse geometrical structures of spacetime and incorporates in a systematic way various Lorentz and parity symmetry violation models.

References:

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