Contribution ID: **32** Type: **not specified**

Towards a New Paradigm: Relativity in Configuration Space

Tuesday 28 August 2007 16:15 (45 minutes)

A generalization of the theory of relativity is considered in which spacetime M_4 is replaced by the configuration space $calC$ associated with a given physical system. In particular, for a system of point particles we assume that its dynamical behavior is determined by the minimal length action in $calC$. In other words, the system is considered as a point that traces a geodetic line in configuration space. The theory thus predicts in general a different dynamical behavior for a many particle system than does the ordinary theory. But in particular, for a suitable metric of $calC$, we obtain the ordinary many particle action in the presence of gravitational field. In general, the configuration space can have non vanishing curvature. From the point of view of 4-dimensional spacetime, which is a subspace of $calC$, there exist extra forces that act on a particle, besides the ordinary gravity. Observations suggest that the ordinary theory cannot be straightforwardly applied to the large scale system such as galaxies, clusters of galaxies and the universe. Instead one has to introduce the concept of dark matter and dark energy, or alternatively, to consider suitable modifications of the theory of gravity (MOND). We propose to explore the possibility that general relativity, not in spacetime M_4, but in multidimensional configuration space $calC$ might solve such astrophysical puzzles. The theory can also be applied to other sorts of configuration spaces, e.g., those associated with extended objects such as strings and branes. This enables a deeper understanding of the geometric principle behind the string theory, and the insight on the occurrence of the Yang-Mills and gravitational fields.

Presenter: Prof. PAVSIC, Matej (Josef Stefan Institute, Ljubljana)

Session Classification: Quantum Gravity