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Metric-Affine Gravity: From theory to applications in black holes and cosmology.

Thursday 26 October 2023 14:00 (1 hour)

Metric-Affine Gravity constitutes a natural extension of General Relativity that incorporates the notions of torsion and nonmetricity in an enriched space-time geometry. In particular, the spin angular momentum of matter turns out to operate as a source of torsion, whereas the so-called dilation and shear currents of matter act as sources of nonmetricity. In this talk, I will introduce the basic concepts of these theories with the aim to present applications in both black holes and cosmology. I will present an exact static and spherically symmetric black hole solution with spin, dilation and shear charges corresponding to the broadest family of black holes found so far. Some rotating black-hole extensions and the corresponding algebraic classification of the gravitational fields will also be presented. In the last part of my talk, I will focus on cosmology and present the formulation of the linear cosmological perturbation theory using the 3+1 and SVT decomposition for the corresponding geometrical quantities involved in the theory. As an interesting example, the cosmological perturbation of the spin-3 field appearing in nonmetricity will be discussed.

Presenter: BAHAMONDE, Sebastian (Tokyo Institute of Technology)