Seminario de Geometría y Topología

Progress towards a mathematical theory of Supergravity

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Resumen:

I will introduce a system of partial differential equations on a four-manifold M involving a Lorentzian metric coupled to a section of a Lorentzian submersion as well as to a positively-polarized two-form taking values on a tamed flat symplectic vector bundle. I will give a set of sufficient conditions for this system to reduce, when restricted to a contractible open set of M, to the standard local formulas used by physicists in the context of four-dimensional Supergravity and String Theory compactifications, providing thus a mathematically rigorous and globally non-trivial extension of the latter. We call the resulting theory a "Generalized Einstein-Section-Maxwell theory", or GESM for short. I will characterize the global automorphism group of a generic GESM theory, giving then a precise characterization of what is known in the literature as the "U-duality group of the theory", and I will discuss Dirac quantization, which is implemented in terms of a "Dirac system", namely a particular type smooth fiber subbundle of full integral lattices of the symplectic vector bundle of the theory. Finally, I will comment on various open mathematical problems regarding the GESM system of partial differential equations, most of them completely unexplored since the system has been only recently formulated in the literature. This is based on recent and ongoing work with Calin Lazaroiu.

Lugar: Universidad Complutense de Madrid
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