The role of gravity in particle physics

Jorge Antonio Zanelli Iglesias
Centro de Estudios Científicos, Chile

The Standard Model describes three fundamental forces at the subatomic level and the elementary particles that interact through them. This framework is built on an elegant local symmetry principle of nature, which implies the existence of the fundamental interactions described by connection gauge fields. The elementary particles are of two types: Bosons, spin 1 quanta of the gauge fields; Fermions, spin 1/2 leptons and quarks that couple to the gauge fields. Gravitation, on the other hand, is the oldest known and the least understood of the fundamental forces of nature. Gravity is also founded on a local symmetry principle: invariance under local Lorentz transformations. The gauge field in this case is the Lorentz connection and what plays the role of the elementary particles is the metric structure. How these two frameworks can be combined into a single structure is the purpose of this talk.