



CSIC

CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

INSTITUTO DE ESTRUCTURA DE
LA MATERIA

CSIC

C/ Serrano 121, 28006 Madrid

Tel.: 915616800 Fax: 915645557

SEMINARIO DE FÍSICA GRAVITACIONAL

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A classical setting for Loop Quantum Gravity

Abstract : We will review the $U(N)$ framework for Loop Quantum Gravity and describe the corresponding phase space of the $SU(2)$ intertwiners in terms of spinors (imposing appropriate constraints). We will show how its quantization leads back to the standard Hilbert space of intertwiner states. Then, we will take care of the gluing of these intertwiner states in order to construct spin network states. In particular, we will translate the usual loop gravity holonomy observables to our classical framework. Finally, we will propose a way to derive our phase space structure from an action principle which induces non-trivial dynamics for the spin network states. As an specific example, we will discuss the application of our framework to states living on the simple 2-vertex graph and discuss the properties of the resulting Hamiltonian.

Iñaki Garay

Institute for Theoretical Physics III
University of Erlangen-Nürnberg

Lugar: *Sala de Juntas de Serrano 121*
Centro de Física "Miguel A. Catalán"