Quantum Geometry of the Quanta of Space

Seramika Ariwahjoedi

Theoretical Physics Laboratory, THEPI Division,
Institut Teknologi Bandung,
Jl. Ganesha 10 Bandung 40132, West Java, Indonesia.

The introduction of Ashtekar variables gives way to define the appropriate canonical variables useful in the quantization of gravity, namely, the flux and the holonomy. With such variables, the (Dirac) quantization is possible. Using the cylindrical functions, the candidate of Hilbert space of quantum gravity could be obtained. The cylindrical function is defined over a graph embedded in spacetime, hence fixing a graph will result in a truncated Hilbert space of (loop) quantum gravity. A special choice of the Immirzi parameter will result in a compact writing of the three constraints of gravity. One which becomes an interest in this talk is particularly, the Gauss constraint. The solution to this constraint defines the kinematical Hilbert space of Loop Quantum gravity, with spin network state as its basis. Defining the geometric operators, the states in the kinematical Hilbert space represents quanta of space, the 'quantum polyhedron'.