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Loop Quantum Gravity and the Quantization of Null Surfaces

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It is arguably one of the main achievements of loop quantum gravity (LQG) to have demonstrated that space itself may have an atomic structure. One of the main open questions for LQG is how to reconcile its fundamental discreteness with general relativity in the continuum. In this talk, I will discuss recent progress regarding this question and I will show, in fact, that the loop gravity discreteness of space can be derived from a conventional Fock representation in the continuum. The derivation is based on certain boundary spinors that can be used as new canonical variables for general relativity on a null surface. I will discuss the geometric origin of these variables and explain their relevance for other approaches to quantum gravity, such as twistor theory.