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How quantization of gravity leads to a discrete space-time

The idea that the Planck length is the smallest unit of length, and the Planck time the smallest unit of time, is natural and has been suggested many times. One can, however, also derive this more rigorously, using nothing more than the fact that black holes emit particles, according to Hawking's theory, and that these particles interact gravitationally.

It is then observed that the particles, going in and out, form quantum states bouncing against the horizon. The dynamics of these microstates can be described in a partial wave expansion, but Hawking's expression for the entropy then requires a cut-off in the transverse momentum, in the form of a Brillouin zone, and this implies that these particles live on a lattice.

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