

Master2 Internship proposal at CPT, year 2019

Research team:

Cosmology

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Project title:

The quantum degrees of freedom of a region of space

Description:

According to the holographic principle, in the presence of dynamical gravity the number of degrees of freedom associated with a region of space is finite. Such a principle, however, cannot tell us its actual "distribution in space", because it only gives us an upper bound, namely, the area surrounding the region of space itself in Planck units. In different simple spacetimes (Minkowski, de Sitter, Anti de Sitter) we will consider causal diamonds and their foliations into regions of space at different times. Since we can go from one slice to the other through a unitary evolution, each region should contain the same number of degrees of freedom. We will have to find an ansatz for the total number of them that will depend on the volume, on the intrinsic and extrinsic curvature and that is compatible with the holographic principle.

References

- [1] R. Bousso, "A Covariant entropy conjecture," JHEP **9907**, 004 (1999) [hep-th/9905177].