

Master2 Internship proposal at CPT, year 2019

Research team:

Cosmology

Supervisor:

Federico Piazza

e-mail:

fedosquare@gmail.com

Project title:

Entanglement entropy and localization in expanding Universe

Description:

The so-called Bunch-Davis vacuum in an expanding Universe represents perhaps the easiest—and yet non-trivial—example of a time-dependent quantum state. The purpose of this internship is to understand its properties in terms of entanglement entropy of “subregions of space” and to see if and how one could extend to this time-dependent situation alternative localization schemes such as the one induced by the Newton-Wigner position operator.

References

- [1] C. G. Callan, Jr. and F. Wilczek, “On geometric entropy,” *Phys. Lett. B* **333**, 55 (1994) [hep-th/9401072].
- [2] H. Casini and M. Huerta, “Entanglement entropy in free quantum field theory,” *J. Phys. A* **42**, 504007 (2009) [arXiv:0905.2562 [hep-th]].
- [3] S. Cacciatori, F. Costa and F. Piazza, “Renormalized Thermal Entropy in Field Theory,” *Phys. Rev. D* **79**, 025006 (2009) [arXiv:0803.4087 [hep-th]].