

Marginally trapped submanifolds in generalized Robertson-Walker spacetimes

V. L. Cánovas¹

The concept of trapped surfaces was originally formulated by Penrose for the case of 2-dimensional spacelike surfaces in 4-dimensional spacetimes in terms of the signs or the vanishing of the so-called null expansions. More generally, and following the standard terminology in relativity, a codimension two spacelike submanifold is said to be marginally trapped if its mean curvature vector field is lightlike. In this work we consider codimension two marginally trapped submanifolds in the family of general Robertson-Walker spacetimes.

In particular we derive some rigidity results for this type of submanifolds which guarantee that, under appropriate hypothesis, the only ones are those contained in slices. We also derive some interesting non-existence results for weakly trapped submanifolds. In particular, we give applications to some cases of physical relevance such as the Einstein-de Sitter spacetime and certain open regions of de Sitter spacetime, including the so called steady state spacetime. Our results will be an application of the (finite) maximum principle for closed manifolds and, more generally, of the weak maximum principle for stochastically complete manifolds.

This is a joint work with Luis J. Alías and A. Gervasio Colares.

References

- [1] L. J. ALÍAS, V. L. CÁNOVAS AND A. G. COLARES, Marginally trapped submanifolds in generalized Robertson-Walker spacetimes, *Preprint* (2016).

¹Departamento de Matemáticas, Universidad de Murcia, E-30100 Espinardo,
Murcia, Spain
veronica.lopez10@um.es