Mass inflation and strong cosmic censorship for the spherically symmetric Einstein-Maxwell-scalar field system with a cosmological constant and an exponential Price law

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In a previous sequence of papers ([1, 2, 3]) the authors studied the issue of stability of the Cauchy horizon, mass inflation and extensions of solutions, for perturbations of the interior of black hole solutions of the spherically symmetric Einstein-Maxwell-scalar field system with a cosmological constant, with subextremal Reissner-Nordström data imposed along the event horizon.

As an improved model for studying the strong cosmic censorship conjecture, we present more recent results ([4]) where we consider instead a Price law with exponential decay of the scalar field along the event horizon, which is widely expected to be the result of a generic gravitational collapse scenario with positive cosmological constant. We show that the stability of the radius function at the Cauchy horizon always holds and that, depending on the decay rate of the characteristic initial data, mass inflation may or may not occur. In the latter case solutions can be extended accross the Cauchy horizon with Christoffel symbols in L^2_{loc}.

This is joint work with J. Costa, P. Girão and J. Natário.

References

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[3] J. Costa, P. Girão, J. Natário and J. Silva, *On the global uniqueness for the Einstein-Maxwell-scalar field system with a cosmological constant. Part 3. Mass inflation and extendibility of the solutions*, Ann. PDE (2017) **3**: 8.

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