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COLLAPSING SHLLS OF RADIATION IN HIGHER DIMENSIONAL SPACETIME

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General relativity was formulated inspacetime with four dimensions of course. However, there are theoretical hints that we might live in a world with more dimensions. A generalization of general relativity to higher dimensions has been of considerable interest in recent times. It is believed that the underlying spacetime in the large. It is believed that the underlying spacetime in the parge energy 1 imit of the planck energy may have higher dimensions. At this level, all the basic forces of nature are supposed to unify and hence it would be pertinent in this context to consider solutions of the gravitational field equations in higher dimensions. lately there has been significant attention to studying gravitational collapse, in higher dimensions have generalized the oppeniemer-snyder collapse model to higher dimensions.

Higher Dimensional Vaidya Spacetime

The idea that spacetime should be extended from four to higher dimensions was introduced by Kaluza and Klein (1921) to unify gravity and electromagnetism. Five dimensional (5D) spacetime is particularly more relevant because both 10D and 11d Super-gravity theories yield solutions where a 5D spacetime results after dimensional reduction (Schwara, 1983) Hence, we shall confine ourselves to the 5D case.

The higher dimensional vaidya spacetime which describes as implosion of radiation shells is (Iyer and Vishveshwar, 1989)

$$ds2 = -\left(1 - \frac{m\,(v)}{r^2}\right) dv^2 + 2dvdr + r^2 d\,\Omega^2$$

Where $d\,\Omega^2 = d\theta^2{}_1 + sin^2\theta_1\,(d\theta^2{}_2 + sing^2\ {}^2{}_2 + d\theta^2{}_3)$ is the metric of the 3-sphere, where v is a null coordinate with $-\infty < v < \infty$ r is a radial coordinate with $0 \le r \le \infty$ and the arbitrary function m (v) (which is restricted only by the energy conditions), represents the mass at advanced time v. The energy momentum tensor associated with eq. can be written as.

$$Tab = \frac{3}{2r^3}\,\frac{dm}{dv}\,k_a\,k_b$$

wich diverges along r = 0 establishing a scalar polynomial singularity the weyl scalar ($C = C\ a_{bcd}\ c^{abcd}$, C_{adcd} is the weyl tensor) has the same expression as the Kretschmann scalar and thus the weyl scalar also diverges whenever the kretschmann scalar diverges and so thesingularity is physically significant (Brave and Singh, 1997).

The physical situation here is that of a radial influx of a null fluid in an initially flat and empty region of the higher dimensional spacetime for v < 0 we have m (v) = 0, i.e. higher dimensional flat spacetime, and for v> T. dm/dv = 0 m (v) is positive dimensional vaidya, and for v> T we have the higher dimensional Schwarzschild solution. The first higher arrives at r = 0 at time v = 0 and the final at v = T. A central singularity of growing mass is developed at r = 0. we shall now test whether future directed null geodesics terminate at the singularity in the past. If they do, singularity is naked.

CONCLUSIONS

A rigorous formulation and proof for either versioin of the comsic censorship conjecture is not available. Hence, examples shoeing the occurrence of naked singularities remain important and may be valuable if one attempts to formulate the notion of the conjecture in precise mathematical form. The vaidya metric in the 4D case has been extensively used to gravitational collapse we have extended this study to a higher dimensional vaidya metric, and found that strong curvature naked singularities.

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