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Blow-up in the Parabolic Scalar Curvature Equation

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Consider a manifold foliated by topological 2-spheres. Suppose that the intrinsic geometry of the foliation spheres has been specified. We would like to obtain a manifold of prescribed scalar curvature in a non-conformal way by modifying the metric only in a direction transverse to the foliation spheres. That is, we want to find a function u so that the metric

$$g = u^2 dr^2 + h$$

has the desired scalar curvature R , where r is the foliating function and h denotes the metric of the foliation spheres. If the area element of h is expanding with increasing r then this gives rise to a parabolic equation for u in which r plays the role of a time variable. It is easily seen by using the maximum principle that in many cases of physical interest the solution blows up at some finite value of r , say r_1 . The purpose of this talk is to discuss a situation in which blow-up occurs in such a way that the metric can nonetheless be continuously extended up to r_1 , which corresponds to a horizon.

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