

Examples of Naked Singularity Formation in Einstein Vacua

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Abstract. The vacuum Einstein equations in 5+1 dimensions are shown to admit solutions describing naked singularity formation in gravitational collapse from nonsingular asymptotically locally flat initial data that contain no trapped surface. We present a class of specific examples with topology $\mathbb{R}^{3+1} \times S^2$. Thanks to the Kaluza-Klein dimensional reduction, these examples are constructed by lifting continuously self-similar solutions of the 4-dimensional Einstein-scalar field system with a negative exponential potential. The latter solutions are obtained by solving a 3-dimensional autonomous system of first-order ordinary differential equations with a combined analytic and numerical approach. Their existence provides a new test-bed for weak cosmic censorship in higher-dimensional gravity.

References

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