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Black hole instabilities and violation of the weak cosmic censorship conjecture in higher dimensions

Rapidly rotating asymptotically flat black holes in higher dimensions can be unstable to gravitational perturbations of the Gregory-Laflamme type. By evolving these instabilities into the fully non-linear regime using numerical relativity, we find that these black holes develop fractal horizons that pinch off in finite asymptotic time, giving rise to naked singularities. Since these instabilities are generic, they therefore constitute potential counter-examples to the weak cosmic censorship conjecture in higher dimensional asymptotically flat space. These results should also apply to sufficiently small black holes in global anti-de Sitter space.