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Andrea Puhm: A rough end for smooth microstate geometries

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The study of supersymmetric black holes in string theory has been a useful arena for the search for the correct microscopic description of black holes, with one of its greatest triumphs being the explicit stringy counting by Strominger and Vafa of the number of microstates of the D1-D5-P system. The fuzzball program is an attempt to describe these microstates at finite coupling with the extended objects of string theory modifying the structure of the black hole horizon by replacing it with an end to spacetime. An important open question is what fraction of these microstates is smooth, contains singularities corresponding to D-brane sources or is arbitrarily quantum and/or strongly curved. Recently Eperon, Reall, and Santos identified a non-linear classical instability in these geometries due to the growth of excitations at an "evanescent ergosurface"of infinite redshift whose implications for the fuzzball program depend crucially on its endpoint. In this talk I will argue that the instability drives rare smooth microstates with large angular momentum to more typical microstates with smaller angular momentum and terminates when the density of microstates is maximal. At this point, the large stringy corrections to such microstates may render them non-linearly stable just as supergravity breaks down: a rough end for smooth microstate geometries. I will discuss a possible mechanism for this stabilization detailed in an illustrative toy model.