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Exotic Marginally Outer Trapped Surfaces are Unstable

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Recently, significant process has been made in the understanding of how two apparent horizons merge to become one during a black hole collision. Apparent horizons are examples of more general objects called marginally outer trapped surfaces (MOTS) and as an offshoot of the merger studies, we have learned that MOTS are much more common than had been previously realized. For example, apart from its standard horizon, the Schwarzschild spacetime contains a (likely) infinite family of MOTS contained within the black hole region. These MOTS have complicated self-intersecting geometries and so have been dubbed "exotic". However, horizons of black holes have another property beyond being MOTS: they separate regions of outer trapped surfaces (the interior of the black hole) from untapped regions (the exterior). Geometrically this corresponds to a MOTS being *stable* (in a sense closely analogous to minimal surface stability). It has been observed that all of the exotic MOTS in Schwarzschild are unstable in this sense.

In this talk I will present a mathematical proof that a MOTS that doesn't share the symmetries of a spacetime is necessarily unstable. In particular, this includes all of the exotic Schwarzschild MOTS, as well as many more that have recently been studied in the literature.

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