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Relative stability of black hole threshold solutions in gravitational collapse THEODOR BRASOVEANU, FRANS PRETORIUS, Princeton University — We present numerical studies of the relative stability of critical solutions in problems of gravitational collapse. These strong-field solutions to Einstein equations, initially discovered by Matt Choptuik, arise at the threshold of black hole formation. We study the evolution of systems with multiple matter sources in spherical symmetry that exhibit the same type of threshold solution when studied individually and only interact with each other gravitationally. Given the unstable nature of critical solutions, the central question that we address is whether certain types of matter are more prone to collapse in the presence of other types of matter. Using adaptive grid techniques to solve Einstein equations coupled to matter, we notice that the near-critical solution of the combined system seems to switch from one type of threshold to another, as the critical point is approached in parameter space. So far, we have indication that massless scalar fields dominate the stability hierarchy in a mixed-matter system, but the overall dynamics depends on the relative amounts of energy present in the system and on their corresponding spatial distribution.

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