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Studying competitive critical behavior in problems of gravitational collapse, using numerical relativity THEODOR BRASOVEANU, Princeton University — Einstein equations, with or without coupling to matter, admit special strong-field, non-trivially dynamic solutions which sit at the threshold of black hole formation. These solutions, initially discovered by M. Choptuik, are minimally unstable and can be obtained by studying parametrized families of initial data, where the family parameter can be tuned to control the amount of non-linearity in the generated spacetime. Following the recent introduction of "competitive critical behavior" by the same author, we study the interaction between two different matter models in spherical symmetry that exhibit the same type of threshold solution. Specifically, we look at a a boson star vs. an SU(2) Yang-Mills perturbing field, to investigate if competitive critical behavior occurs and find out whichever solution becomes unstable in the presence of the other. We use finite-difference approximations of PDEs to solve Einstein equations coupled to matter, find the (type I) threshold of black hole formation for each individual matter system and study the relative stability of the two critical solutions.

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