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Critical Collapses in Neutron Star Systems¹ KEJIAN JIN, WAI-MO SUEN, Washington University in St. Louis — Recently we reported that neutron star systems described by a polytropic equation of state (EOS) (with polytropic index $\Gamma = 2$) may undergo gravitational collapses exhibiting type I critical phenomena (Jin and Suen, Phys. Rev. Lett. vol 98, 131101, 2007). In this talk we review and discuss interesting properties of this critical phenomena, including that the critical solutions of the system has a minimum rest mass. Both increasing or decreasing the kinetic/thermal energy in the system will lead to a critical solution with higher rest mass. For $\Gamma = 2$, the minimum mass value is $1.6378 M_{\odot}$ in the absence of angular momentum. We also report on the finding of similar type I critical phenomena with non-zero angular momentum.

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