MAGIC

Science of the Cosmos

Contribution ID: **13** Type: **not specified**

Initial Conditions and Evolution for Spherically Symmetric Collapse

Spherical collapse in general relativity has been studied with different methods, especially by using a priori given equations of state that describe the collapsing matter as a perfect fluid. We propose an alternative perspective, in which the initial density of the perfect fluid is given as a polynomial function of the radial coordinate that is regular everywhere inside the fluid. We then solve the corresponding differential equations, including the TOV equilibrium condition, using a 4-th order Runge-Kutta method and obtain a consistent model with a central perfect-fluid core surrounded by dust. Then, we analyze numerically the evolution of these initial conditions using the Ollinsphere code and obtain as a result a dynamical process in which the dust implodes into the central core to form a collapsed configuration. The density and pressure of the resulting matter distribution satisfy the standard physical conditions. The model is also consistent with the Buchdahl limit and the speed of sound conditions, even by using realistic values of compact astrophysical objects such as neutron stars.

Author: BAYONA BOBADILLA, ELLY ANNE KATHERIN (Instituto de Ciencias Nucleares, Universidad Nacional Autónoma de México)

Presenter: BAYONA BOBADILLA, ELLY ANNE KATHERIN (Instituto de Ciencias Nucleares, Universidad Nacional Autónoma de México)