



GEOMETRY SESSION

Mass and topology of a static stellar model

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14h - 14h40

Math Department - SALA B

Abstract.

This study investigates the topological implications arising from stable (free boundary) minimal surfaces in a static perfect fluid space while ensuring that the fluid satisfies certain energy conditions. Based on the main findings, it has been established the topology of the level set $\{f = c\}$ (the boundary of a stellar model), where c is a positive constant and f is the static potential of a static perfect fluid space. We prove a non-existence result of stable free boundary minimal surfaces in a static perfect fluid space. An upper bound for the Hawking mass for the level set $\{f = c\}$ in a non-compact static perfect fluid space was derived, and the positivity of Hawking mass is provided in the compact case when the boundary $\{f = c\}$ is a topological sphere. We dedicate a section to revisit the Tolman-Oppenheimer-Volkoff solution, an important procedure for producing static stellar models. We will present a new static stellar model inspired by Witten's black hole (or Hamilton's cigar).

2020 Mathematics Subject Classification : 53C21, 53C23, 83C05.

Keywords: static space, perfect fluid, vacuum, minimal surface, free-boundary.

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