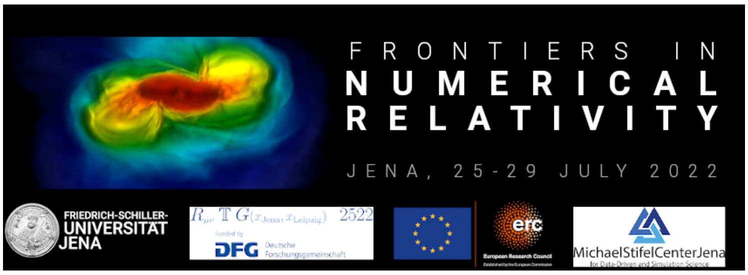

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Core collapse in scalar-tensor theory with massive fields

Friday, 29 July 2022 10:30 (15 minutes)

Though General Relativity has been successfully tested so far, concepts such as dark energy and string theory suggest the need of modifying it. Scalar-tensor theory is one of the most popular alternatives discussed. We produce studies of stellar core collapse in spherical symmetry that were performed by adapting the numerical code GR1D to the case of massive scalar-tensor gravity. We systematically explore the parameter space that characterizes the progenitor stars, the equation of state and the scalar-tensor theory of the core collapse events. We identify a remarkably simple and straightforward classification scheme of the resulting collapse events. For any given set of parameters, the collapse leads to one of three end states, a weakly scalarized neutron star, a strongly scalarized neutron star or a black hole, possibly formed in multiple stages. The latter two end states can lead to strong gravitational-wave signals that may be detectable in present continuous-wave searches with ground-based detectors. We identify a very sharp boundary in the parameter space that separates events with strong gravitational-wave emission from those with negligible radiation.

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Session Classification: Short talks