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Simulating neutron stars under scalar tensor theories with the Einstein Toolkit

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We present a numerical implementation of the Einstein equations under scalar tensor theories (STT) based on the Einstein Toolkit framework. We focus on the Jordan frame, where the influence of the scalar fields on the Einstein equations can be expressed through a modified BSSN (Baumgarte-Shapiro-Shibata-Nakamura) formalism while preserving the standard evolution of matter fields. This approach is particularly useful in the study of neutron stars, as it takes advantage of the modularity of the Einstein Toolkit to include more microphysics, allowing to analyze the structure and properties of neutron stars within these extended theories of gravity and identify deviations from general relativity.

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