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DEEP-TOV FOR CHARACTERIZING NEUTRON STARS

The study of the interior regions of a neutron star is one of the active areas of research and gravitational wave astronomy is one of its critical tools. Currently, astronomers from across the spectrum are detecting different neutron star systems and it has become essential to consistently combine this information. We perform Bayesian inference to constrain the equation of state of the star by incorporating the distributions from NICER, radio as well as gravitational wave observations which, in turn, infers the mass-radius curve. As the number of observations increases, the dimensionality of the sampling for the inference also increases. Therefore, making the sampling process faster is essential. One way to do that is to speed up the Tolman-Oppenheimer-Volkoff (TOV) equation solver. In this work, we have
developed a physics-informed deep neural network model to solve the TOV equation.

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