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Rebuilding Neutron Star EoSs from Observations with Deep Learning

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We present a novel deep learning approach to optimize the equation of state (EoS) for probing neutron star observables. By leveraging an automatic differentiation framework, our method solves inverse problems and achieves accurate EoS optimization. Through training a neural network on a comprehensive dataset, we develop a predictive EoS model that yields precise relationships between pressure, speed of sound, and mass density. Our results align with conventional approaches and are consistent with the observed tidal deformability from the gravitational wave event, GW170817.

Author: WANG, Lingxiao (Frankfurt Institute for Advanced Studies (FIAS))

Co-authors: STOECKER, Horst; ZHOU, Kai; SOMA, Shriya; SHI, Shuzhe

Presenter: WANG, Lingxiao (Frankfurt Institute for Advanced Studies (FIAS))

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