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Gravitational Waves from Isolated Magnetized Neutron Stars

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The detections of gravitational waves (GWs) have significantly influenced physics and astrophysics since the analysis and interpretation of data from merger events constrain the equation of state (EoS) of the neutron stars.
In this work, we explore gravitational waveforms of magnetized rotating neutron stars. For this aim, we use realistic EoS for rotating magnetized neutron stars and calculate the EoS of magnetized neutron star matter by employing the variational method for the least energy. Then we fit the parameters of polytrope EoS on this realistic EoS and by solving the hydrostatic equilibrium equations, we find the deformation of spherical stars. After that, by finding the distortion and eccentricity of the star, we calculate the amplitude of the gravitational waveforms and by comparing them with the observed data of LIGO-Virgo detectors, we can check out our EoS.

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