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Gravitational-wave-driven tidal secular instability in neutron star binaries

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We report the existence of a gravitational-wave-driven secular instability in neutron star binaries, acting on the equilibrium tide. The instability is similar to the classic Chandrasekhar-Friedman-Schutz instability of normal modes and is active when the spin of the primary star exceeds the orbital frequency of the companion. Modeling the neutron star as a Newtonian n=1 polytrope, we calculate the instability timescale, which can be as low as a few seconds at small orbital separations but still larger than the inspiral timescale. The implications for orbital and spin evolution are also briefly explored, where it is found that the instability slows down the inspiral and decreases the stellar spin.

Author: PNIGOURAS, Pantelis (University of Southampton)

Presenter: PNIGOURAS, Pantelis (University of Southampton)

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