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Saturation of the f-mode instability in neutron stars

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Due to the Chandrasekhar-Friedman-Schutz (CFS) instability, the f-mode (fundamental oscillation) in a newborn neutron star is driven unstable by the emission of gravitational waves. This star is usually the result of a core-collapse supernova explosion, but may also be the aftermath of a binary neutron star merger, where a rapidly rotating, supramassive configuration is formed, before its collapse to a black hole. The instability is halted by non-linear coupling to other modes of the star, which drain energy and saturate it. Depending on the saturation point, the generated gravitational wave signal could be detected by the next generation gravitational wave detectors and, thus, provide useful information about the neutron star equation of state.

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