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Nonlinear mode coupling in rotating neutron stars and its effects on the r-mode instability RUXANDRA BONDARESCU, Penn State University, SAUL TEUKOLSKY, IRA WASSERMAN, Cornell University — This talk will focus on describing the nonlinear dynamics of the r-mode instability in rapidly rotating neutron stars. R-modes are oscillations in rotating fluids that occur due to the Coriolis effect. In fast rotators these modes can be driven unstable by the gravitational radiation backreaction force when gravitational driving dominates viscous damping. An unstable L=2, m=2 r-mode spins down a rotating neutron star by converting rotational energy into gravitational radiation and mode energy. It has been suggested that the r-mode instability can set a limiting frequency to accreting neutron stars. Nonlinear effects become important when a mode grows above its parametric instability threshold and excites other near resonant modes in the star. The duration of the instability and the amplitude at which the instability saturates depend on neutron star composition via viscous dissipation and neutrino cooling. In some scenarios r-modes may also lead to detectable gravitational radiation.

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