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R-modes in newborn neutron stars: nonlinear development
RUXANDRA BONDARESCU, SAUL TEUKOLSKY, IRA WASSERMAN, Cornell University — Rotating neutron stars have modes that are driven unstable by the gravitational radiation reaction, principally the "R-mode", a L=m=2 Rossby wave. This instability is active when the gravitational driving dominates the internal fluid dissipation of the star. This enables the star to emit a significant fraction of its rotational energy and angular momentum as gravitational waves. It has been suggested that the R-mode instability could explain the relatively low spin frequencies observed in young pulsars. The frequency to which this instability can spin down the star depends on internal neutron star physics such as viscous dissipation, neutrino cooling and strength of magnetic fields. The nonlinear interactions between the R-mode and other near resonant modes in the star play a very important role in determining how this process works, and also illustrates how instabilities can saturate at low amplitudes. My talk will focus on discussing how nonlinear interactions affect the spin evolution of hot young neutron stars in the first few years after formation.

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