

Abstract Submitted
for the APR12 Meeting of
The American Physical Society

Resonant Shattering of Neutron Star Crusts DAVID TSANG, California Institute of Technology, JOCELYN READ, University of Mississippi, TANJA HINDERER, University of Maryland, ANTHONY PIRO, California Institute of Technology — The resonant excitation of neutron star (NS) modes by tides is investigated as a source of short gamma-ray burst (SGRB) precursors. We find that the driving of a crust-core interface mode can lead to shattering of the NS crust, liberating $10^{46} - 10^{47}$ erg of energy seconds before the merger of a NS-NS or NS-black-hole binary. Such properties are consistent with Swift/BAT detections of SGRB precursors, and we use the timing of the observed precursors to place weak constraints on the crust equation of state. We describe how a larger sample of precursor detections could be used alongside coincident gravitational wave detections of the inspiral by Advanced LIGO class detectors to probe the NS structure. These two types of observations nicely complement one another, since the former constrains the equation of state and structure near the crust-core boundary, while the latter is more sensitive to the core equation of state.

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Date submitted: 06 Jan 2012

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