Abstract Submitted
for the APR10 Meeting of
The American Physical Society

Gravitational Waves from Low Mass Neutron Stars C.J. HOROWITZ, Indiana University — Recently, using large scale molecular dynamics simulations, we determined that neutron star crust is very strong, some 10 billion times stronger than steel [1]. This makes star crust the strongest material known and it can support relatively large "mountains". These bumps on rapidly rotating neutron stars can radiate strong gravitational waves (GW). Therefore, we strongly encourage ongoing and future searches for continuous GW. In the present paper, we speculate that low mass neutron stars, although they may be difficult to produce, could be even stronger GW sources. We find that the crust can support very large ellipticities (fractional differences in moments of inertia) of 0.001 or even larger in low mass neutron stars. This is because a larger fraction of a low mass neutron star is solid crust compared to a 1.4 solar mass star and because the weaker gravity allows the crust to support even larger mountains. Therefore, if low mass neutron stars can be produced, for example via fragmentation during a neutron star merger, then they could produce very strong continuous gravitational waves.

[1] C. J. Horowitz and K. Kadau, Phys. Rev. Lett. 102:191102,2009.

Charles Horowitz
Indiana University

Date submitted: 27 Oct 2009 Electronic form version 1.4