

Abstract Submitted
for the NEF10 Meeting of
The American Physical Society

Gravitational Wave Emission from the Single-Degenerate Channel of Type Ia Supernovae ROBERT FISHER, DAVID FALTA, GAURAV KHANNA, University of Massachusetts Dartmouth — The thermonuclear explosion of a C/O white dwarf as a Type Ia supernova (SN Ia) generates a kinetic energy comparable to that released by a massive star during a SN II event. Current observations and theoretical models have established that SNe Ia are asymmetric, and therefore – like SNe II – potential sources of gravitational wave (GW) radiation. We explore detonation-powered GWs as a potential probe of the explosion mechanism of SNe Ia. We establish an upper-bound GW amplitude and expected frequency range based upon the nearly-universal energetics and nucleosynthetic yields of SNe Ia. We calculate a refined estimate of the GW signal from the single-degenerate channel of SNe Ia using three-dimensional hydrodynamical simulations that undergo a gravitationally-confined detonation (GCD). The GCD mechanism predicts a strongly-polarized GW signal from the single-degenerate channel of SNe Ia that would be detectable in the band around 1 Hz from planned GW observatories, at distances up to several Mpc. If observable, GWs may offer a direct probe into the first few seconds of a SN Ia, and yield insights into its underlying detonation mechanism not possible in the optical portion of the spectrum.

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Date submitted: 28 Sep 2010

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