Post-2007 Explosive Sub-Chandrasekhar Bibliography

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December 14, 2015

Abstract

A living document summarizing the literature on sub-Chandrasekhar mass white dwarf explosions, with a bit of a bias toward explorations of the double detonation model for type Ia supernovae (SNe Ia). The document is focused on the post 2007 publications set off by Bildsten et al's 2007 paper on .Ia's in AM CVn binaries. Many of these papers provide detailed citations to the rich pre-2007 literature.

1 1D Modeling and Analytics

1.1 The Full Core/Shell System

Bildsten et al. (2007)

This is a key paper. My understanding is that it is largely responsible for setting off the current flurry of interest in sub-Chandrasekhar mass explosions. The context is the proposal of ".Ia" events which are about a tenth the brightness of normal SNe Ia for about a tenth the time. What's of key importance is the unprecedentedly low masses of the helium shells considered. This led many others to reexamine this model in the context of SNe Ias.

Shen and Bildsten (2009)

This is a more in-depth exploration of the ideas introduced in Bildsten et al. (2007). A key result, confirmed by others, is the importance of ^{14}N(α, γ)^{18}F(α, p)^{21}Ne and the subsequent ^{12}C(p, γ)^{13}N(α,p)^{16}O reaction. The paper also calculates minimal helium shell masses capable of achieving runaway conditions under their assumptions.

Shen et al. (2010)

The authors expand on previous work to calculate observables for the ".Ia" scenario.

Waldman et al. (2011)

Exploration of the lower end of the core mass range, with $M_{\rm core} \lesssim 0.6\ M_\odot$.

Woosley and Kasen (2011)

An extensive 1D (Kepler) reexamination of explosive burning in helium shells on sub-Chandrasekhar mass carbon/oxygen white dwarfs. This is a phenomenal paper, though quite long. Not a breezy read. But it has it all, modeling accretion, development of some sort of explosion, and synthetic observables for a huge set of models. Stan finds helium novae, shell-only deflagrations, shell-only detonations (though it's not clear these are self-consistent, they may be the result of coarse gridding), and double detonations. This has sorta been the Bible of my dissertation.

Piersanti et al. (2014)

Models of the accretion and outcomes.

Brooks et al. (2015)

MESA modeling of, to an extent, the binary evolution, accretion, and explosion for a range of models.

1.2 Analysis of Particular Aspects of the Problem

Seitenzahl et al. (2009)

Determination of critical sizes and conditions required to initiate ignition of a detonation in the carbon/oxygen core.

Holcomb et al. (2013)

Determination of critical sizes and conditions required to initiate ignition of a detonation in the helium shell, though with a somewhat simplified set of assumptions.

Shen et al. (2013)

Modeling of the donor, with some modeling of the accretion, and considerations of ejecta and circumstellar absorption.

Piro et al. (2014)
: Determination of expected masses of the CO WD in the double detonation model (and others).

Shen and Bildsten (2014)
: Calculations relating to the second detonation in the double detonation scenario. A detonation in the helium shell sends shockwaves propagating radially inward toward the center of the CO WD core. In this paper, Ken and Lars explore these shock waves and do resolved calculations of initiation of detonation. They argue that shockwaves found in the 2D literature are sufficient to set off core detonation.

Shen and Moore (2014)
: In some sense, this is a more detailed version of the Holcomb et al. (2013) analysis. The authors do more detailed calculations of the conditions needed to set off detonation in the helium shell.

Kleiser and Kasen (2014)
: A contrasting view. Some argue sub-Chandra explosions can explain events like SN 2010X. The authors here offer an alternative theory based on core-collapse.

Piro (2015)
: Excellent analysis of turbulent mixing in the helium shell and its consequences for the explosion.

2 Multi-D Modeling

Fink et al. (2007, 2010)
: I combine these because they cover similar ground. The 2010 paper addresses criticisms in the literature of the 2007 paper.

Guillochon et al. (2010)
: This paper doesn't model a conventional double detonation scenario, but instead a case in which violent, dynamical accretion sets off the initial helium detonation.

Kromer et al. (2010)
: The authors calculate synthetic observables for the models of Fink et al. (2010).

Sim et al. (2010)
: A key paper. The authors detonate bare (no helium shell) sub-Chandrasekhar mass white dwarfs and calculate observables.

Dan et al. (2011)
: SPH modeling of the onset of mass transfer in double degenerate mergers.

Dan et al. (2012)
: A survey of over 200 (!!!) SPH simulations of binary evolution. The authors look at mergers, but include mergers relevant to sub-Chandra systems in the context of the sort of model explored in Guillochon et al. (2010).

Raskin et al. (2012)
: SPH mergers and remnants. Includes the sorts of dynamical helium explosions discussed in Guillochon et al. (2010).

Sim et al. (2012)
: Extension of the Fink et al. (2010) methodology to lower mass cores. Includes synthetic observable calculations.

Townsley et al. (2012)
: Model of the flame propagation in thin helium shells.

Dunkley et al. (2013)
: Model of the flame propagation.

Moll and Woosley (2013)

Moore et al. (2013)

Pakmor et al. (2013)
: Mergers of WDs with thin helium shells.

Zingale et al. (2013)
: Low Mach models of the pre-explosion evolution in 3D. This is a methods paper with some initial science results, e.g. a runaway.

Dan et al. (2014)
: A look at merger remnants, including from mergers of CO WD and a helium companion.

Papish et al. (2015)

Models of possible ejecta/companion interactions and comments on possible observational consequences.

Dan et al. (2015)

A pretty comprehensive, SPH look at mergers, subsequent explosions, and remnants. Includes mergers of CO WD + He.

Jacobs et al. (2015)

Clearly, the most important paper of the bunch ;). Here, I build on the methods paper (Zingale et al., 2013). We report on 18 3D models of the pre-explosion dynamics for a range of core and shell masses as well as for "hot" and "cold" core models. We find a variety of outcomes that we characterize as convective runaway (consistent with helium nova), localized runaway (possible seeds for detonation or deflagration), and quasi-equilibrium (which only means they don't runaway promptly, by which we mean in a few convective turnover times).

3 Population Synthesis, Rates, and Such

Ruiter et al. (2011)

Delay time distribution and rate calculations, including those for double det SNe Ia.

Wang et al. (2013)

Population synthesis, rate and delay time calculations in context of sub-Chandra models as SNe Iax progenitors.

Ruiter et al. (2014)

Expansion of Ruiter et al. (2011), with a focus on the impact of helium accretion efficiency. Results continue to be favorable for double detonation progenitors.

4 Observations and Observational Analysis

Kasliwal et al. (2010)

Perets et al. (2010)

SN 2005E, authors argue progenitor may be from helium-accreting WD.

Poznanski et al. (2010)

Brown et al. (2011)

Observations of WD binaries including an extremely low mass companion.

Drout et al. (2013)

Geier et al. (2013)

Harris et al. (2013)

Kilic et al. (2013)

Levitan et al. (2014)

Scalzo et al. (2014)

Analysis of many SNe Ia, reconstructing ejecta masses. Many sub-Chandra masses are inferred.

Inserra et al. (2015)

Boffin (2015)

An analysis to determine binary masses in systems relevant to sub-Chandra explosions.

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