

Astronomy and Astrophysics Library

David Branch · J. Craig Wheeler

Supernova Explosions

Targeting advanced students of astronomy and physics, as well as astronomers and physicists contemplating research on supernovae or related fields, David Branch and J. Craig Wheeler offer a modern account of the nature, causes and consequences of supernovae, as well as of issues that remain to be resolved.

Owing especially to (1) the appearance of supernova 1987A in the nearby Large Magellanic Cloud, (2) the spectacularly successful use of supernovae as distance indicators for cosmology, (3) the association of some supernovae with the enigmatic cosmic gamma-ray bursts, and (4) the discovery of a class of superluminous supernovae, the pace of supernova research has been increasing sharply. This monograph serves as a broad survey of modern supernova research and a guide to the current literature.

The book's emphasis is on the explosive phases of supernovae. Part 1 is devoted to a survey of the kinds of observations that inform us about supernovae, some basic interpretations of such data, and an overview of the evolution of stars that brings them to an explosive endpoint. Part 2 goes into more detail on core-collapse and superluminous events: which kinds of stars produce them, and how do they do it? Part 3 is concerned with the stellar progenitors and explosion mechanisms of thermonuclear (Type Ia) supernovae. Part 4 is about consequences of supernovae and some applications to astrophysics and cosmology. References are provided in sufficient number to help the reader enter the literature.

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Part I Observational Overview and General Interpretations

1	Overview	3
1.1	Introduction	3
1.2	Discovery	4
1.3	Spectral Classification	6
1.4	Photometry	8
1.5	Spectral Evolution	12
1.6	Explosion Mechanisms	14
1.7	Asymmetries and Polarization	16
1.8	Sites, Environments, and Rates	16
1.9	Circumstellar Interaction	18
1.10	Supernova Remnants	19
1.11	Gamma-Ray Bursts	20
1.12	Summary	21
2	Search and Discovery	23
2.1	Introduction	23
2.2	Nearby Supernovae	25
2.3	Hubble-Flow Supernovae	27
2.4	High-Redshift Supernovae	29
2.5	Summary	31
3	Environments and Rates of Supernovae	33
3.1	Introduction	33
3.2	Direct Detection of Progenitors and Companion Stars	33
3.3	Environments in the Local Universe	36
3.4	Rates in the Local Universe	38
3.5	The Galactic Rate	40
3.6	Inferences from Rates About Progenitors of Core-Collapse Supernovae	41
3.7	Rates Versus Redshift	42

3.8	The SN Ia Delay-Time Distribution	43
3.9	Summary	45
4	Spectra	47
4.1	Introduction	47
4.2	Elements of Line Formation in the Photospheric Phase	48
4.2.1	The Velocity Law	49
4.2.2	Resonant-Scattering Line Profile: Qualitative Overview	49
4.2.3	Resonant-Scattering Line Profile: More Quantitative	51
4.2.4	Multiple Scattering: Line Blending	54
4.3	Lines To Be Considered	56
4.4	Synthetic Spectra for the Photospheric Phase	57
4.4.1	SYNOW	57
4.4.2	Elementary Monte Carlo	59
4.4.3	Detailed Calculations	59
4.5	The Nebular Phase	64
4.6	Spectropolarimetry	67
4.7	Summary	73
5	Light Curves	75
5.1	Introduction	75
5.2	Physical Conditions	75
5.3	Understanding Basic Properties of Supernova Light Curves	77
5.4	Energy Sources	81
5.4.1	Shock Energy: Breakout, Fireball, and Plateau	81
5.4.2	Radioactive Decay of ^{56}Ni and ^{56}Co	82
5.4.3	Gamma-Ray Light Curves	90
5.4.4	Buried Pulsar/Magnetar	91
5.5	Application to Supernova Types	92
5.5.1	SN Ia	92
5.5.2	SN Ib/c	95
5.5.3	SN IIb	96
5.5.4	SN IIP	96
5.5.5	SN 1987A	98
5.5.6	Light-Curve Extremes	98
5.6	Detailed Calculations	99
5.7	Summary	99
6	Circumstellar Interaction	101
6.1	Introduction	101
6.2	Hydrodynamic Interaction	102
6.3	Optical, UV, and X-ray Emission from the Shocked Regions	104
6.4	Optical, UV, and X-ray Emission from the Unshocked Regions	105

6.5	Radio Emission	105
6.6	Dust and Infrared Emission	108
6.7	Clumps	109
6.8	Shells	110
6.9	Optically-Thick CSM	110
6.10	Core-Collapse Supernovae	112
6.11	Type Ia Supernovae	112
6.12	Summary	113
7	Supernova Remnants	115
7.1	Introduction	115
7.2	SNR Populations	116
7.2.1	Galactic SNRs	116
7.2.2	Extragalactic SNRs	117
7.3	Evolution of Shell SNRs	118
7.3.1	Classical Theory	118
7.3.2	Presupernova Shells	118
7.4	Young SNRs	119
7.4.1	Cassiopeia A	120
7.4.2	SN 1054 and the Crab Nebula	123
7.4.3	SN 1181 and SNR 3C58	126
7.4.4	SN 1572 and the Tycho SNR	127
7.4.5	SN 1604 and the Kepler SNR	129
7.4.6	SN 1006 and SNR G327.6+14.6	130
7.4.7	SN 185 and SNR RCW 86	131
7.4.8	G1.9+0.3: The Youngest Known Galactic SNR	132
7.4.9	SN 1885A and Its SNR in the Andromeda Galaxy	133
7.5	Summary	133
8	Evolution to Catastrophe	135
8.1	Introduction	135
8.2	Making White Dwarfs	139
8.3	Red Giants and Red Supergiants	142
8.3.1	Dredge-Up	143
8.3.2	AGB Stars, SAGB Stars, Thermal Pulses	145
8.3.3	C, S, and M Stars	147
8.4	Mass Loss	148
8.4.1	Radiation-Driven Mass Loss in Massive Stars	149
8.4.2	AGB Mass Loss	150
8.4.3	Mass Loss by Luminous Blue Variables	152
8.5	Presupernova Evolution	152
8.5.1	Helium Flash	152
8.5.2	Evolution to Degenerate Carbon Ignition	153
8.5.3	Degenerate Oxygen–Neon–Magnesium Cores	154
8.5.4	Off-center Oxygen and Neon Ignition	155
8.5.5	Iron-Core Evolution	156

8.6	Dynamic Instability	159
8.7	Evolution with Rotation	162
8.8	Binary-Star Evolution	164
8.9	Summary	168

Part II Massive-Star Supernovae

9	Core Collapse	173
9.1	Introduction	173
9.2	History of the Collapse Problem	174
9.3	Collapse Physics	178
9.3.1	Entropy	178
9.3.2	The Equation of State	180
9.3.3	Weak Interactions	181
9.3.4	Neutrino Transport	183
9.4	Collapse Dynamics	185
9.4.1	Initial Iron-Core Collapse	185
9.4.2	Electron Capture and Accretion-Induced Collapse	188
9.4.3	Post-Bounce Dynamics	189
9.4.4	Standing Shock Phase	190
9.4.5	Explosion Phase	192
9.4.6	Fluid Instabilities	194
9.4.7	The Standing Accretion Shock Instability: SASI	196
9.5	Rotation and Magnetic Fields	198
9.5.1	Basic Magnetorotational Physics: Length and Time Scales	199
9.5.2	Magnetic-Field Compression and Wrapping	201
9.5.3	The Magnetorotational Instability: MRI	202
9.5.4	Other MHD Processes	205
9.5.5	Non-Axisymmetric Instabilities: NAXI	205
9.6	Black Hole Formation	206
9.7	Quark and Strange Stars	208
9.8	Summary	208
10	Pair-Instability Supernova Models	211
10.1	Introduction	211
10.2	Pre-Explosion Evolution	211
10.3	Dynamics of Pair Instability	213
10.4	Nucleosynthesis	214
10.5	Predicted Observational Properties	214
10.6	Upper Limit to PISN: Collapse to Black Holes	216
10.7	Pulsational Pair Instability: PPISN	217
10.8	Summary	218

11	Supernova 1987A	219
11.1	Introduction	219
11.2	The Progenitor Star and the Triple-Ring System	219
11.3	Neutrinos and the Compact Remnant	223
11.4	Ejecta	226
11.4.1	Breakout and Fireball	226
11.4.2	Radioactivity	227
11.4.3	Molecules and Dust	230
11.4.4	Asymmetries and Mixing	231
11.5	Nucleosynthesis	237
11.6	Circumstellar Interaction	240
11.7	Related Progenitor Stars and Supernovae	242
11.8	Summary	243
12	Type IIP Supernovae	245
12.1	Introduction	245
12.2	Case Study: SN 1999em	246
12.3	Expected Progenitor Structures	249
12.4	Breakout, Fireball, and Rise-Time	251
12.5	The Plateau Phase	252
12.5.1	Typical SN IIP	253
12.5.2	Weak SN IIP	254
12.5.3	Continuity and Correlations	256
12.5.4	Estimating Masses and the Red Supergiant Problem	256
12.6	The Nebular Phase	258
12.7	Circumstellar Interaction	260
12.8	Dust	261
12.9	Polarization and Asymmetry	262
12.10	Summary	264
13	Type IIL Supernovae	267
13.1	Introduction	267
13.2	Case Studies	268
13.2.1	SN 1979C	268
13.2.2	SN 1980K	272
13.3	Synthesis of SN IIL Characteristics	275
13.4	Summary	279
14	Type IIn Supernovae	281
14.1	Introduction	281
14.2	Case Studies	282
14.2.1	SN 1988Z	282
14.2.2	SN 1998S	285
14.2.3	SN 2010jl	289

14.3	Synthesis of SN IIn Characteristics	293
14.3.1	Light-Curve Subtypes	293
14.3.2	Spectra.....	298
14.3.3	Mass Loss and Circumstellar Medium.....	300
14.3.4	Infrared Observations and Dust	302
14.3.5	Polarization and Asymmetry	302
14.3.6	Statistics	307
14.4	Impostors	307
14.5	SN1994W-Likes	313
14.6	Summary	316
15	Type IIb Supernovae	319
15.1	Introduction	319
15.2	Case Study: SN 1993J	320
15.2.1	Light Curve	320
15.2.2	Spectra.....	322
15.2.3	Polarization and Asymmetry	323
15.2.4	Circumstellar Interaction	326
15.2.5	Evolutionary Models	327
15.2.6	Model Light Curves	328
15.2.7	Models of Photospheric Spectra	329
15.2.8	Models of Nebular Spectra	332
15.3	Synthesis of SN IIb Characteristics	333
15.3.1	SN IIb Subtypes.....	333
15.3.2	Light Curves	333
15.3.3	Spectra.....	334
15.3.4	Circumstellar Interaction	336
15.3.5	Polarization and Asymmetry	336
15.4	Models of SN IIb.....	338
15.4.1	Evolutionary Models	338
15.4.2	Model Light Curves	341
15.4.3	Models of Photospheric Spectra	342
15.4.4	Models of Nebular Spectra	343
15.5	Summary	343
16	Type Ib Supernovae	345
16.1	Introduction	345
16.2	Case Studies	346
16.2.1	SN 1983N	346
16.2.2	SN 2008D	350
16.3	Synthesis of SN Ib Characteristics	352
16.3.1	Light Curves	353
16.3.2	Spectra.....	356
16.3.3	Polarization and Asymmetry	360
16.3.4	Circumstellar Interaction	365

16.4	Models of SN Ib	366
16.4.1	Evolutionary Models	366
16.4.2	Model Light Curves	367
16.4.3	Models of Photospheric Spectra	368
16.4.4	Models of Nebular-Phase Spectra.....	370
16.5	SN Ibn	370
16.5.1	Case Study: SN 2006jc	371
16.5.2	Synthesis of SN Ibn Characteristics.....	373
16.6	Summary	375
17	Type Ic Supernovae	379
17.1	Introduction	379
17.2	Case Study: SN 1994I	380
17.3	Synthesis of SN Ic Characteristics	385
17.3.1	Light Curves	385
17.3.2	Spectra.....	388
17.3.3	Polarization and Asymmetry	391
17.3.4	Circumstellar Interaction	392
17.4	SN Ic-bl.....	393
17.4.1	Case Study: SN 2002ap	393
17.4.2	Synthesis of Properties of SN Ic-bl	397
17.4.3	The Connection Between SN Ic-bl and Gamma-Ray Bursts	399
17.5	Models of SN Ic and SN Ic-bl.....	402
17.5.1	Evolutionary Models	403
17.5.2	Models of Light Curves	404
17.5.3	Models of Photospheric Spectra	408
17.5.4	Models of Nebular Spectra	410
17.6	Summary	411
18	Superluminous Supernovae	413
18.1	Introduction	413
18.2	SLSN-II	416
18.2.1	Case Study: SN 2006gy	416
18.2.2	Synthesis of SLSN-II Characteristics	419
18.3	SLSN-I	422
18.3.1	Case Study: SN 2010gx	422
18.3.2	Synthesis of SLSN-I Characteristics	423
18.4	Superluminous PISN?	430
18.5	Summary	432

Part III Type Ia Supernovae

19	Degenerate Carbon Burning	437
19.1	Introduction	437
19.2	Single Degenerate: The Smoldering Phase	437

19.3	Convective Urca Process	440
19.4	Dynamical Degenerate Carbon Burning	441
19.4.1	General Considerations	441
19.4.2	The Basics of Supersonic and Subsonic Combustion	443
19.5	Astrophysical Deflagration: Subsonic Burning and Combustion	448
19.5.1	Laminar Flames	449
19.5.2	Rayleigh–Taylor Instability	452
19.6	Interaction of Buoyancy, Turbulence and Flames	453
19.6.1	Landau–Darrieus Instability	453
19.6.2	Buoyancy-Driven Flames	455
19.6.3	The Gibson Scale	455
19.6.4	Turbulent Flames	458
19.6.5	Distributed Flames?	460
19.7	Ignition Kernels	462
19.8	Early Runaway: Hot Spots and Bubbles	463
19.9	Astrophysical Detonation: Supersonic Burning	466
19.10	Detonation Instability	467
19.11	Deflagration-to-Detonation Transition	472
19.11.1	The Zel’dovich Gradient Mechanism	473
19.11.2	Turbulent Flame-Brush Instability	475
19.11.3	DDT Due To Turbulent Flame-Brush Instability	478
19.12	Summary	480
20	Observational Properties	483
20.1	Introduction	483
20.2	Case Studies	484
20.2.1	SN 2011fe	484
20.2.2	SN 2014J	489
20.3	Homogeneity	496
20.4	Diversity and Correlations	501
20.5	Multiparameter Subclassification	507
20.6	Colors and Extinction	511
20.7	Substantially Super-Chandrasekhar SN Ia	512
20.8	Outliers	513
20.9	Correlations Between Properties of SN Ia and Host Galaxies	514
20.10	Variations with Redshift	516
20.11	Summary	516
21	Progenitors	519
21.1	Introduction	519
21.2	Single Degenerates	523
21.2.1	Canonical SD Model: C/O White Dwarfs Accreting to the Chandrasekhar Mass	524

21.2.2	Canonical SD Model: Binary Evolution and Population Synthesis	528
21.2.3	Distribution Predictions	531
21.2.4	M-Dwarf Donors?	533
21.2.5	Super-Chandrasekhar Single Degenerates	534
21.2.6	Sub-Chandrasekhar Single Degenerates	535
21.3	Double Degenerates	536
21.3.1	Canonical Super-Chandrasekhar DD Model	536
21.3.2	Canonical DD Model: Binary Evolution and Population Synthesis	537
21.3.3	Noncanonical and Sub-Chandrasekhar Possibilities ...	539
21.4	Core Degenerates	541
21.5	Observed Candidate Progenitor Systems	542
21.5.1	Recurrent Novae	542
21.5.2	Other Possibilities	543
21.6	Other Evidence Constraining Progenitor Systems	544
21.6.1	Archival Observations at Supernova Sites	544
21.6.2	Statistics of Supersoft X-Ray Sources	545
21.6.3	Breakout and Interaction with an Accretion Disk	546
21.6.4	Interaction with a Donor Star	546
21.6.5	Circumstellar Interaction	548
21.6.6	Supernova Remnants	550
21.6.7	White Dwarf Populations.....	551
21.6.8	Abundance Constraints	552
21.7	Summary	552
22	Explosion Models	555
22.1	Introduction	555
22.2	Dark Time	557
22.3	Single-Degenerate Chandrasekhar-Mass Models	559
22.3.1	Central Detonation.....	559
22.3.2	Model W7	559
22.3.3	3D Deflagrations	560
22.3.4	Delayed Detonations.....	561
22.3.5	Pulsation-Driven Detonations	569
22.3.6	Gravitationally-Confined Detonations	570
22.3.7	Single-Degenerate Super-Chandrasekhar Models.....	572
22.3.8	Single-Degenerate Sub-Chandrasekhar Models.....	573
22.4	Double-Degenerate Models	575
22.4.1	The Canonical Double-Degenerate Model	575
22.4.2	Other Double-Degenerate Possibilities	576
22.5	Summary	578
23	Related Explosions	581
23.1	Introduction	581
23.2	SN 2002ic-Likes: SN Ia-CSM.....	581

23.3	SN 2002cx-Likes: SN Iax	585
23.4	SN 2002bj-Likes: SN Ia?	590
23.5	SN 2005E-Likes: Calcium-Rich Transients	592
23.6	Summary	594

Part IV Consequences, Applications, and Summary

24	Consequences of Supernovae	597
24.1	Introduction	597
24.2	Compact Remnants	597
	24.2.1 Neutron Stars	598
	24.2.2 Black Holes	601
24.3	Surviving Companion Stars	604
24.4	Neutrinos and Gravitational Waves	605
24.5	Nucleosynthesis	607
24.6	Dust	612
24.7	Mechanical and Radiative Feedback	613
	24.7.1 Current Epoch	614
	24.7.2 Early Universe	616
24.8	Chemical Enrichment	617
	24.8.1 The Galaxy	618
	24.8.2 Damped Lyman- α Clouds	619
24.9	Cosmic Rays	620
24.10	Gamma Rays	621
24.11	Effects on the Solar System?	622
24.12	Life	622
24.13	Summary	624
25	Applications of Supernovae to Other Areas of Astrophysics and Physics	625
25.1	Introduction	625
25.2	Distances to Type Ia Supernovae	625
	25.2.1 Accelerating Cosmic Expansion and Dark Energy	625
	25.2.2 Flows, Peculiar Velocities, and Anisotropy	627
	25.2.3 Cosmic Opacity	628
	25.2.4 The Hubble Constant	628
25.3	Distances to Core-Collapse Supernovae	629
25.4	Astrophysics	630
	25.4.1 Interstellar Medium	630
	25.4.2 Supernovae from the First Stars	632
	25.4.3 Lensing	632
	25.4.4 Time Dilation	634
	25.4.5 Finding Dwarf Galaxies and Intracluster Populations	634

25.5	Physics.....	634
25.5.1	Constraints from Core Collapse.....	634
25.5.2	Constraints from SN Ia.....	635
25.6	Summary.....	635
26	Summary and Prospects.....	637
26.1	Introduction.....	637
26.2	Massive-Star Supernovae.....	637
26.3	Type Ia Supernovae.....	638
26.4	Prospects.....	639
26.4.1	Observations.....	639
26.4.2	Modeling.....	641
26.5	Conclusion.....	642
	Appendix: Abbreviations.....	643
	References.....	647
	Index.....	699