

A graduate-level textbook on the astrophysics of binary star systems and their evolution

Physics of Binary Star Evolution is an up-to-date textbook on the astrophysics and evolution of binary star systems. Theoretical astrophysicists Thomas Tauris and Edward P.J. van den Heuvel cover a wide range of phenomena and processes, including mass transfer and ejection, common envelopes, novae and supernovae, X-ray binaries, millisecond radio pulsars, and gravitational wave (GW) sources, and their links to stellar evolution.

The authors walk through the observed properties and evolution of different types of binaries, with special emphasis on those containing compact objects (neutron stars, black holes, and white dwarfs). Attention is given to the formation mechanisms of GW sources—merging double neutron stars and black holes as well as ultra-compact GW binaries hosting white dwarfs—and to the progenitors of these sources and how they are observed with radio telescopes, X-ray satellites, and GW detectors (LIGO, Virgo, KAGRA, Einstein Telescope, Cosmic Explorer, and LISA). Supported by illustrations, equations, and exercises, *Physics of Binary Star Evolution* combines theory and observations to guide readers through the wonders of a field that will play a central role in modern astrophysics for decades to come.

- 465 equations, 47 tables, and 350+ figures
- More than 80 exercises (analytical, numerical, and computational)
- Over 2,500 extensive, up-to-date references

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"Physics of Binary Star Evolution contains a wealth of information not gathered together anywhere else."

—Virginia Trimble, former president, Commission on Binary and Multiple Star Systems of the International Astronomical Union

"Tauris and van den Heuvel draw on their decades of innovation and experience in binary star astrophysics to provide a definitive book on the subject. Physics of Binary Star Evolution starts with essentials for every astronomy student, while later chapters meet the needs of both beginning and advanced researchers. It features numerous exercises suitable for both the classroom and self-study."

—E. Sterl Phinney, California Institute of Technology

"Stellar astronomy is undergoing a renaissance with binary stars leading the way. This book will become the standard book for graduate classes and at the same time will serve as the gateway for those interested in binary star research."

—Shri Kulkarni, California Institute of Technology

"This is the advanced-level textbook that I have long been waiting for, written by absolute authorities in the field. I certainly recommend Physics of Binary Star Evolution to students and anyone who wishes to familiarize themselves with the exciting phenomena of binary systems."

—Selma E. de Mink, Max Planck Institute for Astrophysics

"This is a beautifully presented guide to the evolution of binary stars. Two giants of the field take us on an exciting journey through the theoretical and observational landscape, spiced up with tidbits of history and accompanied by illustrations and problems. The emphasis on massive binaries, including neutron stars and black holes, will be particularly useful to newcomers to binary evolution arriving from emerging fields such as gravitational-wave astronomy, while old hands will appreciate the authors' unique perspectives."

—Ilya Mandel, Monash University

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Preface		xi
1	Introduction: The Role of Binary Star Evolution in Astrophysics	1
2	Historical Notes on Binary Star Discoveries	10
2.1	Visual Binaries and the Universal Validity of the Laws of Physics	10
2.2	Astrometric Binaries	11
2.3	Spectroscopic Binaries	14
2.4	Eclipsing Binaries	15
2.5	The Discovery of the Binary Nature of Novae and Other Cataclysmic Variables	17
2.6	The Discovery of the Binary Nature of the Brightest X-ray Sources in the Sky	20
2.7	Centaurus X-3: Discovery of the First Neutron Star X-ray Binary	21
2.8	Cygnus X-1: Discovery of the First Black Hole X-ray Binary	22
2.9	The Discovery of the Existence of Double NSs and Double BHs	25
2.10	The Discovery of Millisecond Radio Pulsars: Remnants of LMXBs	26
2.11	Type Ia, Ib, and Ic SNe: Results of the Evolution of Binary Systems	27
2.12	Binary Nature of Blue Stragglers, Barium Stars, and Peculiar Post-AGB Stars	29
	Exercises	31
3	Orbits and Masses of Spectroscopic Binaries	33
3.1	Some Basics about Binary Orbits	33
3.2	Orbit Determination	36
3.3	Determination of Stellar Masses	41
3.4	Masses of Unevolved Main-sequence Stars	42
3.5	The Most Massive Stars	44
3.6	Falsification of Radial Velocity Curves	46
3.7	The Incidence of Interacting Binaries and Their Orbital Distributions and Masses	51
	Exercises	57
4	Mass Transfer and Mass Loss in Binary Systems	59
4.1	Roche Equipotentials	59
4.2	Limitations in the Concept of Roche Equipotentials	63

4.3	Orbital Changes due to Mass Transfer and Mass Loss in Binary Systems	65
4.4	Observational Examples	83
4.5	Basic Physics of Mass Transfer via L_1	88
4.6	Accretion Disks	98
4.7	Tidal Evolution in Binary Systems	109
4.8	Common Envelopes	115
4.9	Eddington Accretion Limit	131
	Exercises	134
5	Observed Binaries with Non-degenerate or White Dwarf Components	139
5.1	Introduction	139
5.2	Unevolved Systems	142
5.3	Evolved Systems with Non-degenerative Components	143
5.4	Systems with One or Two White Dwarfs	152
	Exercises	167
6	Observed Binaries with Accreting Neutron Stars and Black Holes: X-ray Binaries	168
6.1	Discovery of NS and BH Character of Bright Galactic X-ray Sources	168
6.2	Two Types of Persistent Strong X-ray Sources: HMXBs and LMXBs	176
6.3	HMXBs and LMXBs vs. IMXBs	180
6.4	Determinations of NS Masses in X-ray Binaries	188
6.5	BH X-ray Binaries	191
6.6	Binaries and Triples with Non-interacting BHs	206
	Exercises	209
7	Observed Properties of X-ray Binaries in More Detail	213
7.1	High-mass X-ray Binaries in More Detail	213
7.2	Stellar Wind Accretion in More Detail	227
7.3	Spin Evolution of Neutron Stars	232
7.4	The Corbet Diagram for Pulsating HMXBs	243
7.5	Orbital Changes due to Torques by Stellar Wind Accretion, Mass Loss, and Tides	245
7.6	Measuring BH Spins in X-ray Binaries	245
7.7	Ultra-luminous X-ray Binaries	252
7.8	Low-mass X-ray Binaries in More Detail	258
	Exercises	270
8	Evolution of Single Stars	271
8.1	Overview of the Evolution of Single Stars	271
8.2	Final Evolution and Core Collapse of Stars More Massive than $8 M_\odot$	299

8.3	Evolution of Helium Stars	315
	Exercises	325
9	Stellar Evolution in Binaries	326
9.1	Historical Introduction: Importance of Mass Transfer	326
9.2	Evolution of the Stellar Radius and Cases of Mass Transfer	327
9.3	RLO: Reasons for Large-scale Mass Transfer and Conditions for Stability of the Transfer	334
9.4	Results of Calculations of Binary Evolution with Conservative Mass Transfer	340
9.5	Examples of Non-conservative Mass Transfer	353
9.6	Comparison of Case B Results with Some Observed Types of Systems	360
9.7	Differences in Final Remnants of Mass-transfer Binaries and Single Stars	366
9.8	Slowly Rotating Magnetic Main-sequence Stars: The Products of Mergers?	371
	Exercises	374
10	Formation and Evolution of High-mass X-ray Binaries	376
10.1	Introduction: HMXBs are Normal Products of Massive Binary Star Evolution	376
10.2	Formation of Supergiant HMXBs	376
10.3	Formation of B-emission (Be)/X-ray Binaries	379
10.4	WR Binaries, HMXBs, and Runaway Stars	386
10.5	Stability of Mass Transfer in HMXBs	393
10.6	The X-ray Lifetime and Formation Rate of the Blue Supergiant HMXBs	395
10.7	Highly Non-conservative Evolution and Formation of Very Close Relativistic Binaries	403
10.8	Formation Models of HMXBs Different from Conservative Case B Evolution	408
10.9	The Lower Mass Limit of Binary Stars for Terminating as a BH	411
10.10	Final Evolution of BH-HMXBs: Two Formation Channels for Double BHs	414
10.11	Final Evolution of Wide-orbit BH-HMXBs via CE Evolution	415
10.12	Final Evolution of Relatively Close-orbit BH-HMXBs via Stable RLO	419
10.13	Refinement of the DNS Formation Model: Case BB RLO in Post-HMXB Systems	423
	Exercises	431
11	Formation and Evolution of Low-mass X-ray Binaries	433
11.1	Origin of LMXBs with Neutron Stars	433
11.2	Origin of LMXBs with Black Holes	449

11.3	Mechanisms Driving Mass Transfer in Close-orbit LMXBs and CVs	450
11.4	Formation and Evolution of UCXBs	464
11.5	Mechanisms Driving Mass Transfer in Wide-orbit LMXBs and Symbiotic Binaries	470
11.6	Stability of Mass Transfer in Intermediate-Mass and High-Mass X-ray Binaries	475
	Exercises	477
12	Dynamical Formation of Compact Star Binaries in Dense Star Clusters	480
12.1	Introduction	480
12.2	Observed Compact Object Binaries in Globular Clusters: X-ray Binaries and Radio Pulsars	482
12.3	Possible Formation Processes of NS Binaries in Globular Clusters	483
12.4	Dynamical Formation of Double BHs	489
12.5	Compact Objects in Globular Clusters Constrain Birth Kicks	492
13	Supernovae in Binaries	495
13.1	Introduction	495
13.2	Supernovae of Type Ia	498
13.3	Stripped-Envelope Core-Collapse SNe	513
13.4	Electron-capture SNe in Single and Binary Stars	518
13.5	Ultra-Stripped Supernovae	523
13.6	Comparison between Theory and Observations of SNe Ib and Ic	529
13.7	Supernova Kicks	531
13.8	Kinematic Impacts on Post-SN Binaries	541
	Exercises	556
14	Binary and Millisecond Pulsars	560
14.1	Introduction to Radio Pulsars	561
14.2	To Be Recycled or Not to Be Recycled	571
14.3	MSPs with He WD or Sub-stellar Dwarf Companions—Evolution from LMXBs	578
14.4	MSPs with CO WD Companions—Evolution from IMXBs	591
14.5	Formation of MSPs via Accretion-induced Collapse	595
14.6	Recycling of Pulsars	597
14.7	Masses of Binary Neutron Stars	618
14.8	Pulsar Kicks	635
14.9	Formation of Double Neutron Star Systems	637
	Exercises	648
15	Gravitational Waves from Binary Compact Objects	652
15.1	The Evidence of GWs prior to LIGO	655
15.2	GW Luminosity and Merger Timescale	658

15.3	Observations of GW Signals from Binaries	661
15.4	Galactic Merger Rates of Neutron Star/Black Hole Binaries	664
15.5	Formation of Double Black Hole Binaries	667
15.6	Properties of GW Sources Detected so Far	678
15.7	Empirical Merger Rates	694
15.8	BH Spins—Expectations and Observations	696
15.9	Anticipated Other Sources to be Detected in the GW Era	706
15.10	GW Follow-up Multimessenger Astronomy	712
15.11	Cosmological Implications	718
15.12	LISA Sources	718
15.13	LISA Sensitivity Curve and Source Strain	730
	Exercises	736
16	Binary Population Synthesis and Statistics	739
16.1	Introduction	739
16.2	Methodology of Population Synthesis	741
16.3	Empirical vs. Binary Population Synthesis-Based Estimates of Double Compact Object Merger Rates	747
16.4	Some History of Early Binary Population Synthesis: Evolution of Open Star Clusters with Binaries	753
	Acknowledgments	761
	Answers to Exercises	765
	List of Acronyms	767
	References	771
	Index	843