

1. Record Nr.	UNINA9910143819003321
Titolo	The Journal of extra-corporeal technology
Pubbl/distr/stampa	[Reston, Va., etc.] : , : American Society of Extra-Corporeal Technology France : , : EDP Sciences
ISSN	2969-8960
Descrizione fisica	volumes : illustrations ; ; 26 cm
Disciplina	617/.412059
Soggetti	Blood - Circulation, Artificial Hemodialysis Dialysis Cardiopulmonary bypass Extracorporeal Circulation Cardiopulmonary Bypass Circulation extracorporelle Hémodialyse Dialyse Periodical Fulltext Online Resources. Periodicals. Internet Resources.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Periodico
Note generali	Summer issues <1985>-1987 also called: Proceedings issue. One issue per year for 1992- called: Proceedings issue.

2. Record Nr.	UNINA9910953937303321
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Titolo	Stellar Interiors : Physical Principles, Structure, and Evolution / / by Carl J. Hansen, Steven D Kawaler
Pubbl/distr/stampa	New York, NY : , : Springer New York : , : Imprint : Springer, , 1994
ISBN	1-4684-0214-5
Edizione	[1st ed. 1994.]
Descrizione fisica	1 online resource (XIV, 446 p.)
Collana	Astronomy and Astrophysics Library, , 2196-9698
Disciplina	520
	523.86
Soggetti	Astronomy Astrophysics Geophysics Astronomy, Observations and Techniques
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Bibliographic Level Mode of Issuance: Monograph
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	1 Preliminaries -- 1.1 Hydrostatic Equilibrium -- 1.2 An Energy Principle -- 1.3 The Virial Theorem and Its Applications -- 1.4 The Constant-Density Model -- 1.5 Energy Generation and Transport -- 1.6 Stellar Dimensional Analysis -- 1.7 Evolutionary Lifetimes on the Main Sequence -- 1.8 Exercises -- 1.9 References and Suggested Readings -- 2 An Overview of Stellar Evolution -- 2.1 Pre-Main Sequence Evolution -- 2.2 Single Stars On and Near the Main Sequence -- 2.3 Evolution of Single Stars Off the Main Sequence -- 2.4 Late Stages of Evolution -- 2.5 Evolution in Close Binary Systems -- 2.6 Special Kinds of Stars -- 2.7 Concluding Remarks -- 2.8 Exercises -- 2.9 References and Suggested Readings -- 3 Equations of State -- 3.1 Distribution Functions -- 3.2 Blackbody Radiation -- 3.3 Ideal Monatomic Gas -- 3.4 The Saha Equation -- 3.5 Fermi-Dirac Equations of State -- 3.6 "Almost Perfect" Equations of State -- 3.7 Adiabatic Exponents and Other Derivatives -- 3.8 Exercises -- 3.9 References and Suggested Readings -- 4 Radiative and Conductive Heat Transfer -- 4.1 Radiative Transfer -- 4.2 The Diffusion Equation -- 4.3 A Brief Diversion into "?"s -- 4.4 Radiative Opacity Sources -- 4.5 Heat Transfer by Conduction -- 4.6 Tabulated Opacities -- 4.7 References and Suggested Readings

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5.2 Variations on the MLT -- 5.3 References and Suggested Readings
-- 6 Stellar Energy Sources -- 6.1 Gravitational Energy Sources -- 6.2
Thermonuclear Energy Sources -- 6.3 The Proton-Proton Chains -- 6.4
The Carbon-Nitrogen-Oxygen Cycles -- 6.5 Helium-Burning Reactions
-- 6.6 Carbon, Neon, and Oxygen Burning -- 6.7 Silicon "Burning" --
6.8 Neutrino Emission Mechanisms -- 6.9 Exercises -- 6.10 References
and Suggested Readings -- 7 Stellar Modeling -- 7.1 The Equations of
Stellar Structure -- 7.2 Polytropic Equations of State and Polytropes --
7.3 The Approach to Real Models -- 7.4 References and Suggested
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Neutrino "Problem" -- 8.4 The Role of Rotation in Evolution -- 8.5
References and Suggested Readings -- 9 Structure and Evolution of
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Dwarf Evolution -- 9.3 The Magnetic White Dwarfs -- 9.4 References
and Suggested Readings -- 10 Asteroseismology -- 10.1 Adiabatic
Radial Pulsations -- 10.2 Nonadiabatic Radial Motions -- 10.3 An
Introduction to Nonradial Oscillations -- 10.4 Helioseismology -- 10.5
Asteroseismology of White Dwarfs -- 10.6 References and Suggested
Readings -- A Glossary -- B Physical and Astronomical Constants -- C
Sample Computer Codes -- C.1 The ZAMS Model Builder -- C.2
Adiabatic Pulsation Code.

Sommario/riassunto

That trees should have been cut down to provide paper for this book was an ecological affront. From a book review. - Anthony Blond (in the Spectator, 1983) The first modern text on our subject, Structure and Evolution of the Stars, was published over thirty years ago. In it, Martin Schwarzschild described numerical experiments that successfully reproduced most of the observed properties of the majority of stars seen in the sky. He also set the standard for a lucid description of the physics of stellar interiors. Ten years later, in 1968, John P. Cox's two-volume monograph Principles of Stellar Structure appeared, as did the more specialized text Principles of Stellar Evolution and Nucleosynthesis by Donald D. Clayton-and what a difference ten years had made. The field had matured into the basic form that it remains today. The past twenty-plus years have seen this branch of astrophysics flourish and develop into a fundamental pillar of modern astrophysics that addresses an enormous variety of phenomena. In view of this it might seem foolish to offer another text of finite length and expect it to cover any more than a fraction of what should be discussed to make it a thorough and self-contained reference. Well, it doesn't. Our specific aim is to introduce only the fundamentals of stellar astrophysics. You will find little reference here to black holes, millisecond pulsars, and other "sexy" objects.
