

CONTENTS

Volume 2

Foreword

J. L. GREENSTEIN

Observational Data on the Extremes of Stellar Evolution

Technology	5
Faint Stars, an Example of the Effect of Technological Progress	7
Stars Being Born	10
The Lithium Problem	16
Recent Observations of Nucleosynthetic Interest	17
Brief Outline of Major Nucleosynthetic Processes	19
The Elementary Theory of Degenerate Star Structure	25
Conclusion	34

K. GREISEN

The Physics of Cosmic x-ray, γ -ray, and Particle Sources

Introduction: Sources of High-Energy Particles	41
ESP (Energetic Solar Particles)	55
Discrete Sources Remote from the Sun	63
Interactions in the Interstellar Medium	75
Origin of the Primary Electrons	85
Cosmic Gamma Rays	101
Cosmic X-Rays	132

D. LAYZER

Cosmogonic Processes

Introduction	155
Simple Friedmann Universes	158

Local Irregularities in a Friedmann Universe: The Newtonian Approximation	166
The Weak-Field Approximation	181
The Gravitational Field in the Weak-Field Approximation	196
Gravitoturbulence	203
Thermodynamic Instability in a Cold Plasma	206
Thermal History	212
Instability at Intermediate Scales	216
The Gravitoturbulent Spectrum	219
Formation of Self-Gravitating Systems	222

C. C. LIN and F. H.-S. SHU

Density Wave Theory of Spiral Structure

General Background	239
QSSS Hypothesis	247
An Elementary Theory	255
Dynamics of an Infinitesimally Thin Stellar Disk	261
Theory of Density Waves in a Composite System of Stellar and Gaseous Disks	266
Comparison With Observations	274
Concluding Remarks	286
Appendix A (to Section 1): Elementary Facts About Galaxies	290
Appendix B (to Section 4): Mathematical Theory of Stellar Dynamics for an Infinitesimally Thin Disk in Differential Rotation—General Principles	294
Appendix C (to Section 5)	304
Appendix D. Some Comments on Dispersion Velocities in Length Scales	314
Appendix E. The Effect of Finite Disk Thickness	314
Appendix F. The Formulation of the Complete Problem	322

R. K. SACHS and J. EHLERS

Kinetic Theory and Cosmology

Space-Time	335
Particles	345
Appendix: Tensor Calculus	370

