

Contents

Editors' Foreword	v
Preface	vii
I. <i>Introduction</i>	1
II. <i>Pre-Einsteinian Notions of Relativity</i>	4
III. <i>The Problem of the Relativity of the Laws of Electrodynamics</i>	10
IV. <i>The Michelson-Morley Experiment</i>	14
V. <i>Efforts to Save the Ether Hypothesis</i>	17
VI. <i>The Lorentz Theory of the Electron</i>	23
VII. <i>Further Development of the Lorentz Theory</i>	26
VIII. <i>The Problem of Measuring Simultaneity in the Lorentz Theory</i>	31
IX. <i>The Lorentz Transformation</i>	36
X. <i>The Inherent Ambiguity in the Meanings of Space- Time Measurements, According to the Lorentz Theory</i>	40
XI. <i>Analysis of Space and Time Concepts in Terms of Frames of Reference</i>	42
XII. <i>"Common-Sense" Concepts of Space and Time</i>	48
XIII. <i>Introduction to Einstein's Conceptions of Space and Time</i>	52
XIV. <i>The Lorentz Transformation in Einstein's Point of View</i>	61
XV. <i>Addition of Velocities</i>	66

XVI.	<i>The Principle of Relativity</i>	70
XVII.	<i>Some Applications of Relativity</i>	75
XVIII.	<i>Momentum and Mass in Relativity</i>	81
XIX.	<i>The Equivalence of Mass and Energy</i>	91
XX.	<i>The Relativistic Transformation Law for Energy and Momentum</i>	96
XXI.	<i>Charged Particles in an Electromagnetic Field</i>	100
XXII.	<i>Experimental Evidence for Special Relativity</i>	106
XXIII.	<i>More About the Equivalence of Mass and Energy</i>	110
XXIV.	<i>Toward a New Theory of Elementary Particles</i>	119
XXV.	<i>The Falsification of Theories</i>	123
XXVI.	<i>The Minkowski Diagram and the K Calculus</i>	131
XXVII.	<i>The Geometry of Events and the Space-Time Continuum</i>	146
XXVIII.	<i>The Question of Causality and the Maximum Speed of Propagation of Signals in Relativity Theory</i>	155
XXIX.	<i>Proper Time</i>	161
XXX.	<i>The "Paradox" of the Twins</i>	165
XXXI.	<i>The Significance of the Minkowski Diagram as a Reconstruction of the Past</i>	173

Appendix: Physics and Perception, 185

Index, 231