# Contents

Preface v

## PART I Laws, Explanation, and Probability

- 1 The Value of Laws: Explanation and Prediction 3
- 2 Induction and Statistical Probability 19
- 3 Induction and Logical Probability 29
- 4 The Experimental Method 40

## PART II Measurement and Quantitative Language

- 5 Three Kinds of Concepts in Science 51
- 6 The Measurement of Quantitative Concepts 62
- 7 Extensive Magnitudes 70
- 8 Time 78
- 9 Length 86
- 10 Derived Magnitudes and the Quantitative Language 96
- 11 Merits of the Quantitative Method 105
- 12 The Magic View of Language 115

#### PART III The Structure of Space

- 13 Euclid's Parallel Postulate 125
- 14 Non-Euclidean Geometries 132

## x Contents

- 15 Poincaré versus Einstein 144
- 16 Space in Relativity Theory 152
- 17 Advantages of Non-Euclidean Physical Geometry 163
- 18 Kant's Synthetic A Priori 177

## PART IV Causality and Determinism

- 19 Causality 187
- 20 Does Causality Imply Necessity? 196
- 21 The Logic of Causal Modalities 208
- 22 Determinism and Free Will 216

PART V Theoretical Laws and Theoretical Concepts

- 23 Theories and Nonobservables 225
- 24 Correspondence Rules 232
- 25 How New Empirical Laws Are Derived from Theoretical Laws 240
- 26 The Ramsey Sentence 247
- 27 Analyticity in an Observation Language 257
- 28 Analyticity in a Theoretical Language 265

# PART VI Beyond Determinism

- 29 Statistical Laws 277
- 30 Indeterminism in Quantum Physics 283
  Bibliography 293
  Index 297