

## Contents

<i>List of contributors</i>	<i>page</i> viii
<i>Preface</i>	xi
<i>Acknowledgements</i>	xiv
<i>Editorial note</i>	xv
<b>Part I Overviews</b>	1
1 Introduction and overview	3
<i>Bernard Carr</i>	
2 Living in the multiverse	29
<i>Steven Weinberg</i>	
3 Enlightenment, knowledge, ignorance, temptation	43
<i>Frank Wilczek</i>	
<b>Part II Cosmology and astrophysics</b>	55
4 Cosmology and the multiverse	57
<i>Martin J. Rees</i>	
5 The anthropic principle revisited	77
<i>Bernard Carr</i>	
6 Cosmology from the top down	91
<i>Stephen Hawking</i>	
7 The multiverse hierarchy	99
<i>Max Tegmark</i>	
8 The inflationary multiverse	127
<i>Andrei Linde</i>	
9 A model of anthropic reasoning: the dark to ordinary matter ratio	151
<i>Frank Wilczek</i>	

10	Anthropic predictions: the case of the cosmological constant <i>Alexander Vilenkin</i>	163
11	The definition and classification of universes <i>James D. Bjorken</i>	181
12	M/string theory and anthropic reasoning <i>Renata Kallosh</i>	191
13	The anthropic principle, dark energy and the LHC <i>Savas Dimopoulos and Scott Thomas</i>	211
<b>Part III Particle physics and quantum theory</b>		219
14	Quarks, electrons and atoms in closely related universes <i>Craig J. Hogan</i>	221
15	The fine-tuning problems of particle physics and anthropic mechanisms <i>John F. Donoghue</i>	231
16	The anthropic landscape of string theory <i>Leonard Susskind</i>	247
17	Cosmology and the many worlds interpretation of quantum mechanics <i>Viatcheslav Mukhanov</i>	267
18	Anthropic reasoning and quantum cosmology <i>James B. Hartle</i>	275
19	Micro-anthropic principle for quantum theory <i>Brandon Carter</i>	285
<b>Part IV More general philosophical issues</b>		321
20	Scientific alternatives to the anthropic principle <i>Lee Smolin</i>	323
21	Making predictions in a multiverse: conundrums, dangers, coincidences <i>Anthony Aguirre</i>	367
22	Multiverses: description, uniqueness and testing <i>George Ellis</i>	387
23	Predictions and tests of multiverse theories <i>Don N. Page</i>	411
24	Observation selection theory and cosmological fine-tuning <i>Nick Bostrom</i>	431

Cambridge University Press

978-0-521-84841-1 - Universe or Multiverse?

Edited by Bernard Carr

Table of Contents

[More information](#)

*Contents*

vii

25	Are anthropic arguments, involving multiverses and beyond, legitimate? <i>William R. Stoeger, S. J.</i>	445
26	The multiverse hypothesis: a theistic perspective <i>Robin Collins</i>	459
27	Living in a simulated universe <i>John D. Barrow</i>	481
28	Universes galore: where will it all end? <i>Paul Davies</i>	487
	<i>Index</i>	507