

TABLE of CONTENTS

IntroductionPp. 1–6.

PART ONE

Chapter I: Planck Invents the Quantum.....Pp. 7–49.

Introduction; Blackbody Radiation; Planck's Discovery of the Blackbody

Formula; Planck's Discovery as Prolog. Biographical Note.

Paper I·1,2,4,5,6: Excerpts from M. Planck, Annalen der Physik 1,
69, 719 (1900); ibid. 4, 553, 564 (1901); Die Naturwiss. 14/15, 153 (1943).

Paper I·3: Excerpt from W. Wien, Annalen der Physik 4, 422 (1901).

Chapter II: Einstein and Compton.....Pp. 50–101.

Introduction and Discussion; Biographical Notes.

PaperII·1,2,3,3A: Excerpts from A. Einstein, Annalen der Physik 17, 132
(1905); Physikalische Zeits. 10, 817 (1909); Deutsche Physikal. Gesells.

Verhandlungen 18, 318 (1916); Phys. Zeits. 18, 121 (1917).

Paper II·4,5,6: Excerpts from A.H. Compton, Phys. Rev. 21, 483, 409 (1923);
Proc. N.A.S. 11, 303 (1925).

Chapter III: Bohr's Hydrogen Atom.....Pp. 102–127.

Introduction and Discussion.

Paper III·1: Excerpt from N. Bohr, Phil. Mag. 26, 1 (1913).

Paper III·2: Excerpt from N. Bohr, H.A. Kramers and J.C. Slater, Zeits. f.
Phys. 24, 69 (1924).

Chapter IV: de Broglie Waves.....Pp. 128–141.

Introduction and Discussion; Biographical Note.

Paper IV·1: Excerpt from L. de Broglie, Phil. Mag. 47, 446 (1924).

Chapter V: Kramers and Heisenberg.....Pp. 142–166.

Introduction and Discussion; Biographical Notes.

Paper V·1: Excerpt from K. Schwarzschild, Sitz. d. Math.-Phys. K. Deut.
Akad. Wiss. Berlin 16, 548 (1916).

Paper V·2: Excerpt from H.A. Kramers and W. Heisenberg, *Zeits. f. Phys.* 31, 681 (1925).

PART TWO

Chapter VI: Heisenberg Invents Quantum Dynamics.....Pp. 167–189.

Introduction and Discussion; Biographical Note.

Paper VI·1: Excerpt from *Zeits. f. Phys.* 33, 879 (1925).

Chapter VII: Born, Heisenberg and Jordan.....Pp. 190–229.

Introduction and Discussion; Biographical Note.

Paper VII·1: Excerpt from M. Born and P. Jordan, *Zeits. f. Phys.* 34, 858 (1925).

Paper VII·2: Excerpt from M. Born, W. Heisenberg and P. Jordan, *Zeits. f. Phys.* 35, 557 (1926).

Chapter VIII: Dirac's Quantum Mechanics.....Pp. 230–246.

Introduction and Discussion; Biographical Note.

Paper VIII·1: P.A.M. Dirac, *Proc. Roy. Soc. A*109, 642 (1925).

Chapter IX: Schrödinger's Wave Mechanics.....Pp. 247–302.

Introduction; So Where Did Schrödinger Go Wrong?; An Expert Comments; Discussion.

Paper IX·1,1b,2,3: Excerpts from E. Schrödinger, *Annalen der Physik* 79, 361, 489, 734 (1926); *Die Naturwiss.* 14, 664 (1926).

PART THREE

Chapter X: Born's Interpretation.....Pp. 303–328.

Introduction; The Essence of Born's Interpretation; von Neumann's Measurement Postulate; Concluding Remarks; Biographical Note.

Paper X·1,2: Excerpts from M. Born, *Zeits. f. Phys.* 37, 863 (1926); *ibid.* 38, 803 (1926).

Chapter XI: Heisenberg's Uncertainty Principle.....Pp. 329–373.

Introduction; Bohr-Heisenberg Personality Conflicts; Concluding Remarks.	
Paper XI·1: Excerpt from W. Heisenberg, Zeits. f. Phys. 43, 172 (1927).	
Paper XI·2: Excerpt from W. Heisenberg, ‘The Development of the Interpretation of the Quantum Theory’ in <i>Niels Bohr and the Development of Physics</i> (Pergamon, London, 1955) W. Pauli, Ed., Pp. 12–29.	
Chapter XII: Bohr’s Interpretation.....	Pp. 374–410.
Introduction and Discussion.	
Paper XII·1: Excerpt from N. Bohr, Nature 121, 580 (1928).	
Chapter XIII: Einstein, Podolsky, and Rosen.....	Pp. 411–452.
Introduction and Discussion.	
Paper XIII·1: Excerpt from A. Einstein, B. Podolsky, and N. Rosen, Phys. Rev. 47, 777 (1935).	
Paper XIII·2: Excerpt from N. Bohr, Phys. Rev. 48, 696 (1935).	
Paper XIII·3: Excerpt from N. Bohr in ‘Atomic Physics and Human Knowledge’ (Wiley, NY, 1958).	

PART FOUR

Chapter XIV: Bohm and Bell, Clauser and Aspect.....	Pp. 453–467.
Introduction; Bell’s Inequality; Aspect’s Experiment; ‘Alice to Bob’ Teleportation; Concluding Remarks; Biographical Notes.	
Chapter XV: Feynman Path Integral.....	Pp. 468–489.
Introduction; Feynman Path Integrals; Influence Functional and Decoherence; Concluding Remarks.	
Paper XV·1: Excerpt from R.P. Feynman, Rev. Mod. Phys. 20, 267 (1948).	
Paper XV·2: Excerpt from R.P. Feynman and F.L. Vernon, Annals of Physics 24, 118 (1963).	
Paper XV·3: Excerpt from P.A.M. Dirac, Phys. Zeits. Sowjetunion 3, 64 (1933).	
Chapter XVI: Hartle’s Interpretation.....	Pp. 490–503.
Decoherent Histories – A) Definitions, B) FPI Decoherence Functional, C) Recovering Conventional Quantum Mechanics;	

The On-Going Debate; Concluding Remarks.

Paper XVI-1: Excerpt from M. Gell-Mann and James B. Hartle, Phys. Rev. D47, 267 (1993).

Chapter XVII: DeWitt's Wave Function of the Universe..Pp. 504–516.

Introduction: The Wheeler-DeWitt Equation; Quantum Creation of the Universe From Nothing; Concluding Remarks.

Paper XVII-1A,B,C,D: Excerpts from Bryce S. DeWitt, Phys. Rev. 160, 1113 (1967); 162 1195, 1239 (1967); Phys. Rev. Lett. 12, 742 (1964).

Paper XVII-2: Excerpt from A. Vilenkin, Phys. Lett. 117B, 25 (1982).

Paper XVII-3: Excerpt from J.B. Hartle and S.W. Hawking, Phys. Rev. D28, 2960 (1983).

Chapter XVIII: Deutsch's Quantum Computer.....Pp. 517–525.

Introduction; Elements of Quantum Computation; Physical Model of Shor's Lemma; Basic Operations of Quantum Computation; Physical Realization of the Basic Operations; Concluding Remarks.

Chapter XIX: The Next 100 Years.....Pp. 526–538.

IndexPp. 539–543.