

CONTENTS

Spin, or actually: Spin and Quantum Statistics	1
<i>Jürg Fröhlich</i>	
1. Introduction to ‘Spin’	1
2. The Discovery of Spin and of Pauli’s Exclusion Principle, Historically Speaking	6
3. Some of the Mathematics of Spin and a Theorem of Weyl	15
4. Stability of Non-Relativistic Matter in Arbitrary External Magnetic Fields	31
5. Electrons Interacting with the Quantized Electromagnetic Field; Radiative Corrections to the Gyromagnetic Factor	36
6. Three Methods to Measure g_e	40
7. KMS, Spin and Statistics, CPT	44
References	57
New Kinds of Quantum Statistics	61
<i>Frank Wilczek</i>	
1. Braids, Permutations, and In Between	62
2. Abelian Anyons	64
3. Nonabelian Anyons	66
References	69
Anyons and Lowest Landau Level Anyons	71
<i>Stéphane Ouvry</i>	
1. Introduction	72
2. The LLL-anyon model	79
3. LLL-anyon thermodynamics	85
4. Minimal Difference Partitions and Trees	94
5. Conclusion	98
Acknowledgements	98
References	98
Probing a Single Isolated Electron: New Measurements of the Electron Magnetic Moment and the Fine Structure Constant	105
<i>Gerald Gabrielse</i>	
1. Introduction	105
2. Quantum Cyclotron	106
3. Feedback Cooling	113
4. First One-Particle Self-Excited Oscillator	120
5. New Measurement of the Electron Magnetic Moment	128

6. New Determination of the Fine Structure Constant	135
7. Almost Outdated	141
8. Conclusion	141
References	142
The 2007 Nobel Prize in Physics: Albert Fert and Peter Grünberg	147
<i>Vincent Cros, Albert Fert, Pierre Sénéor and Frédéric Petroff</i>	
1. The roots of spintronics and the discovery of GMR	147
2. From GMR to spintronics	149
3. Present and future technological impact of GMR and spintronics	153
Acknowledgments	156
References	156
Magnetic Resonance Imaging: From Spin Physics to Medical Diagnosis	147
<i>Pierre-Jean Nacher</i>	
1. Historical introduction	159
2. Basic physics of NMR	161
3. Principles of MRI	165
4. Lung MRI with polarized noble gases	171
5. Conclusion and prospects	185
References	188