

# Contents

<b>Introductory Notes, by Mrs. Kathleen Maiman</b>	<b>xvii</b>
--	-------------

## **Part I The Maiman Memoirs**

<b>Prologue</b>	<b>3</b>
<b>1 Setting the Stage</b>	<b>7</b>
Laser Inroads	7
Discovery	8
Coherence	9
Soar Higher	11
Concentration	11
The Leap of Ten Thousand	12
Motivation	13
<b>2 Stepping Stones</b>	<b>17</b>
Early Experiences	17
Prophetic Beginning	18
Early Adventures	18
Games and Books	19
School Antics	20
Introduction to Electronics	21
Abe's Creative Ideas	22
Abe's Values	23
Nollenberger Electric	24
More Electronics	25



<b>3</b>	<b>The Ivory Tower</b>	<b>33</b>
	Changing Direction	33
	Impressions from the University of Colorado	34
	My Brief Experience at Columbia Graduate School	34
	Stanford Entry Strategy	35
	Willis Lamb: Guide and Mentor	36
	Living Conditions	36
	Ph.D. Thesis Experiment	37
	Reassessment	37
	The New Design	39
	Stanford Exodus Barriers	40
	Exodus Strategy	41
	The Plea Bargain	42
	The Laser Connection	42
	Around the World	43
	Ph.D. Aftermath	44
<b>4</b>	<b>Entering the Real World</b>	<b>51</b>
	Employment Dilemma	51
	The Lockheed Lesson	52
	Marvin Ettinghoff	53
	The Irwin Hahn Connection	54
	The Hughes Cast of Characters	55
	A Blind Date	57
	Lola	57
	Taking Care of Some Unfinished Business	58
<b>5</b>	<b>The Ruby Maser Distraction</b>	<b>59</b>
	Reluctance	59
	Irnee D'Haenens	60
	Standard Maser Design	60
	A Radical New Design	62
	Cryogenics, the "Killer"	63
<b>6</b>	<b>Building Blocks</b>	<b>67</b>
	Radiation and Atoms	67
	The "Inverted Population" and "Negative Temperature"	69
	The Laser Condition	70



<b>7</b>	<b>Laser Chronology</b>	<b>73</b>
	Stimulated Emission Proposals	73
	The Maser, an Interlude on the Way to Laser	74
	Potassium Vapor Laser?	75
<b>8</b>	<b>Race to the Light</b>	<b>77</b>
	Atmospheric Conditions	77
	The Late Entry	79
	Hughes' Reluctance	79
	Possible Directions and Approaches	80
	Strategy Guidelines; the Thought Process	82
	The Crystal Bias	82
	Profile of a Pink Ruby	84
	Ruby's Potential	84
	Laser Genotype	86
<b>9</b>	<b>Three Levels "Can't Work"</b>	<b>89</b>
	Shawanga Lodge Conference	89
	The Schawlow Goof	90
	The Meaning of Three-Level and Four-Level Lasers	91
	Some Spin Control	94
	The Schawlow Ripple Effect	94
<b>10</b>	<b>Obstacles and Solutions</b>	<b>95</b>
	Irwin Wieder Distraction	95
	The Monochromator Hassle	97
	The Ruby Obsession	97
	Redo the Fluorescence Measurement	98
	The AH6 Design	98
	Brightness Temperature	99
	The Pulsed Concept	100
	External Factors	101
<b>11</b>	<b>Let There Be Coherent Light</b>	<b>103</b>
	The Laser Design	105
	The Crucial Test	106
	The Laser Process	107
	Clogston's Proclamation	108
	Do It!	109



<b>12</b>	<b>The Light Fantastic</b>	<b>113</b>
	The Hughes Reaction	113
	Crystal Quality	114
	More Confirming Measurements	114
<b>13</b>	<b>Publication Fiasco—Enter Politics</b>	<b>117</b>
	<i>Physical Review Letters</i> Rejection	117
	The <i>Nature</i> Publication	119
	Premature Public Release	119
	Establishment Politics	120
	One More Publication Goof	120
<b>14</b>	<b>The News Release</b>	<b>125</b>
	Press Conference	125
	A Plumber's Kit	128
	<i>Time-Life</i>	129
	Death Ray	129
	Bette Davis	130
	The Life and Death Ray	130
<b>15</b>	<b>Aftershocks and Ripple Effects</b>	<b>135</b>
	Pandemonium	135
	Trauma at Bell	136
	The Science Community Reaction	136
	The Townes Reaction	137
	The Stark Contrast	138
	Denial	139
	New "Stubby" Rubies	139
	Laser Research and Funding Explosion	139
	Bell Labs' Dirty Tricks	140
	Ken Wickersheim	140
<b>16</b>	<b>Nullification Tactics</b>	<b>143</b>
	The Twenty-Fifth Anniversary	144
	The Phony Fortieth	144
	The APS Timeline	144
	The Berkeley Conference	145
	The Berkeley Conference Program Game	146



<b>17 Bandwagoning</b>	<b>149</b>
The Presence Effect	149
Copycat Lasers and Other Laboratory Curiosities	150
More Presence Effect	151
Laser Efficiency	152
A Continuous Ruby Laser	152
<b>18 Forty Years of Spin</b>	<b>155</b>
Some Sour Grapes	156
Internet Spin	157
The Grapes Are Still Sour	157
<b>19 Exploding a Myth</b>	<b>159</b>
Reinvention of the Fabry–Perot	160
The Deficient Potassium-Vapor Proposal	161
“Has to Work”	163
Staking Out a Claim	163
<b>20 Exit Hughes, Enter Korad</b>	<b>165</b>
Hughes Departure	165
Holding onto the Historic First Laser	166
Growing Ruby Crystals	167
Korad	168
The Q-Switched Laser	169
The Magic of Nonlinear Optics	170
Prokhorov	171
<b>21 A Solution Looking for a Problem</b>	<b>183</b>
Early Hype	183
The Laser Armada	185
Applications Begin	186
<b>22 Hughes Patent Blunders</b>	<b>191</b>
Hughes Passes on Filing Patent	191
A Question of Ownership	192
Saving the Patent for Hughes	193
National Inventors Hall of Fame	194
Hughes’ Embarrassment	194
Kathleen	195



<b>23</b>	<b>The Paper Patents</b>	<b>201</b>
	Patent Categories	201
	The Schawlow-Townes Patent	202
	Gordon Gould Patent	203
	A Travesty of Justice	205
<b>24</b>	<b>Award Happenings</b>	<b>209</b>
	The Hertz & LBJ Awards	209
	The Wolf Prize	211
	The Japan Prize	212
	Emperor Hirohito	213
	The Red Tie Affair	214
	Tragedy Strikes	216
<b>25</b>	<b>South American Adventure</b>	<b>227</b>
	Backdrop	227
	Paraguay	228
	Terror in Argentina	230
	<b>Epilogue: Afterthoughts</b>	<b>233</b>
	Metamorphosis	233
	It Should Have Been Done Earlier	234
	Why Was I the One?	235
	Price of Success	236
	Laser Nobel(s)	237
	Lasers in Medicine	238
	A Concluding Thought	238
	<b>Part II The Supplementary Material</b>	
<b>26</b>	<b>Addendum 1: Speech by Dr. Theodore H. Maiman, July 7, 1960, at Press Conference, New York, Announcing the Creation of the First Laser</b>	<b>245</b>
<b>27</b>	<b>Addendum 2: "Ted Maiman and the Laser: 50 Years Later," Tribute by Nick Holonyak, Jr.</b>	<b>255</b>
<b>28</b>	<b>Addendum 3: "Maiman's Laser: A Legacy of Limitless Applications," by Jeff Hecht</b>	<b>261</b>



29	Addendum 4: "Pretenders to Invention of the Laser," by Mrs. Kathleen Maiman	267
30	Addendum 5: Scientific Papers and Patents by Theodore H. Maiman	279
31	Addendum 6: Theodore H. Maiman's Major Awards, Prizes, and Citations	281
32	Addendum 7: Table of 38 Nobel Prize Awards Citing the Laser, 1964–2017	283
33	Addendum 8: Table of Japan Prize Awards Citing the Laser, 1987–2014	285
34	Addendum 9: U.S. Patent Number 3,353,115: Ruby Laser Systems, Inventor Theodore H. Maiman	287
35	Addendum 10: Reprint of T.H. Maiman, "Stimulated Optical Radiation in Ruby," <i>Nature</i> , 187, 493–494 (August 6, 1960)	299
	Author Index	303
	Subject Index	307