The Collected Works of Eugene Paul Wigner

Part A

The Scientific Papers

Editor: Arthur Wightman

Annotated by
Nandor Balazs  Herman Feshbach  Brian Judd  Walter Kohn
George Mackey  Jagdish Mehra  Abner Shimony  Alvin Weinberg
Arthur Wightman

Part B

Historical, Philosophical, and Socio-Political Papers

Editor: Jagdish Mehra

Annotated by
Conrad Chester  Gérard Emch  Jagdish Mehra
The Collected Works of Eugene Paul Wigner

Part A
The Scientific Papers

Volume I
Part I: Eugene Paul Wigner – A Biographical Sketch
Part II: Applied Group Theory 1926–1935
Part III: The Mathematical Papers

Volume II
Nuclear Physics

Volume III
Part I: Particles and Fields
Part II: Foundations of Quantum Mechanics

Volume IV
Part I: Physical Chemistry
Part II: Solid State Physics

Volume V
Nuclear Energy:
Part I: Eugene Wigner and Nuclear Energy
Part II: Memoir of the Uranium Project
Part III: Articles, Reports, and Memoranda on Nuclear Energy
Part IV: The Wigner Patents

Part B
Historical, Philosophical, and Socio-Political Papers

Volume VI
Philosophical Reflections and Syntheses

Volume VII
Historical and Biographical Reflections and Syntheses

Volume VIII
Socio-Political Reflections and Civil Defense
The Collected Works of
Eugene Paul Wigner

Part B

Historical, Philosophical, and Socio-Political Papers

Volume VII

Historical and Biographical Reflections and Syntheses

Annotated by Jagdish Mehra
Edited by Jagdish Mehra

Springer
Editors' Preface

The papers have been divided, necessarily somewhat arbitrarily, into two parts

Part A: Scientific Papers
Part B: Historical, Philosophical, and Socio-Political Papers

Within each part, the papers have been divided by subject, and within each subject printed chronologically. With some exceptions, every scientific paper is reprinted in its original form. One class of exceptions consists of papers that are simply translations into Hungarian from German or English; they are omitted, but listed in the bibliographies. Scientific papers originally in Hungarian have been translated into English. Some of the papers of Volume V/Part III, Articles, Reports, and Memoranda on Nuclear Energy, have been reset and the figures redrawn. The originals were declassified reports, some in nearly illegible shape. Some reports and patents in Volume V/Part III and Part IV are listed by title only. In contrast to the scientific papers where the coverage is essentially complete, in Part B, a selection has been made. We believe it is representative of Wigner's far ranging concerns. The five books in which Wigner was involved as author, co-author, or lecturer are not reprinted in the Collected Works, but are noted in the annotations and bibliographies.

Jagdish Mehra
Arthur S. Wightman
Contents

Historical and Biographical Reflections and Syntheses
Annotation by Jagdish Mehra ........................................ 1

PART I
Autobiographical Essays and Interviews
A Physicist Looks at the Soul .................................... 41
The Scientist and Society ........................................ 44
Changes in Physics During My Time in Princeton
and Plans for the Future in Retirement ....................... 51
A Conversation with Eugene Wigner by J. Walsh ............ 57
Introduction (in Honor of Marcos Moshinsky) ................ 79
Recollections and Expectations ................................ 81
An Interview with Eugene Paul Wigner by I. Kardos .......... 90
The Citation: Eugene Paul Wigner. Atoms for Peace Award,
May 18, 1960 (by James R. Killian Jr.) ...................... 109
Response to Citation by James R. Killian Jr. Atoms for Peace Award,
May 18, 1960 ........................................................ 110

PART II
Biographical Sketches
Enrico Fermi (1901–1954) ....................................... 115
New Editor of “Reviews of Modern Physics”: E. U. Condon .......... 120
(With H. H. Goldstine) The Scientific Work of John von Neumann .... 123
John von Neumann (1903–1957) ................................ 127
Biographical Notice of Maria Goeppert Mayer ................ 131
An Appreciation on the 60th Birthday of Edward Teller ...... 133
Leo Szilard (1898–1964) .......................................... 139
Obituary: Maria Goeppert Mayer ................................ 150
Obituary: Werner K. Heisenberg ................................ 152
Obituary: Michael Polanyi ...................................... 154
PART III

Science

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roots of the Atomic Age</td>
<td>231</td>
</tr>
<tr>
<td>(With A. M. Feingold) On the Fermi β-Disintegration Theory</td>
<td>236</td>
</tr>
<tr>
<td>The Role of Mathematical Methods in Physical Theories</td>
<td>246</td>
</tr>
<tr>
<td>The International Oxford Conference on Nuclear Physics</td>
<td>249</td>
</tr>
<tr>
<td>Convocation Address at the University of Alberta</td>
<td>251</td>
</tr>
<tr>
<td>(With F. Seitz) Pure and Applied Nuclear Physics in East and West</td>
<td>254</td>
</tr>
<tr>
<td>Conference on Invariance, Mexico City, July 20–August 30, 1959</td>
<td>259</td>
</tr>
<tr>
<td>Review of the Second Gatlinburg Conference on Reactions</td>
<td></td>
</tr>
<tr>
<td>Between Complex Nuclei</td>
<td>261</td>
</tr>
<tr>
<td>Union of the German Physical Societies: Report of Annual Meeting</td>
<td>270</td>
</tr>
<tr>
<td>(With M. Wheeler Wigner) The Scientist: His Increased Responsibilities</td>
<td>272</td>
</tr>
<tr>
<td>Fermi Award: AEC Honors Teller for Contributions to Nuclear Science</td>
<td>279</td>
</tr>
<tr>
<td>Science: The New Particles and Their Radiations</td>
<td>282</td>
</tr>
<tr>
<td>The Impact of Success on Science</td>
<td>291</td>
</tr>
<tr>
<td>The Roles of Primitive Knowledge, of Language, and of Mathematics in the Physical Sciences</td>
<td>301</td>
</tr>
<tr>
<td>E. P. Wigner's Comments at the Roundtable Discussion</td>
<td></td>
</tr>
<tr>
<td>at the Conference on Nuclear Cross Sections and Technology</td>
<td>302</td>
</tr>
<tr>
<td>The Unity of Science</td>
<td>305</td>
</tr>
<tr>
<td>The Unity of Science: Closing Summary</td>
<td>314</td>
</tr>
<tr>
<td>The Scope and Promise of Science</td>
<td>319</td>
</tr>
<tr>
<td>Methods</td>
<td>321</td>
</tr>
<tr>
<td>Mathematical Physics</td>
<td>345</td>
</tr>
<tr>
<td>The Physical Sciences</td>
<td>378</td>
</tr>
<tr>
<td>The Physical Sciences: Committee Chairman’s Summary</td>
<td>385</td>
</tr>
<tr>
<td>(With E. Padányi-Gúlyás) The Future Vocation of Science</td>
<td>391</td>
</tr>
<tr>
<td>The Future of Science – What One Can Hope For</td>
<td>396</td>
</tr>
<tr>
<td>The Neutron: The Impact of Its Discovery and Its Uses</td>
<td>402</td>
</tr>
<tr>
<td>On Science and Its Evolution</td>
<td>422</td>
</tr>
</tbody>
</table>
Contents

XI

Reflections on the Role and Purpose of Science .................................. 427
The Miracle of Science ........................................................................... 434
Science, Its Future and Purpose .......................................................... 438

PART IV

Science and Society

Reflections on the Atomic Bomb ............................................................. 445
Science in Two Worlds: Its Accomplishments and Aims ......................... 451
Ethics in the Relationship Between Science and Society ......................... 458
Science and Society (Pamphlet) ............................................................. 462
Science and Technology for Affluence and Satisfaction ........................ 468

PART V

Book Reviews

Review of “Kinematic Relativity: A Sequel to Relativity, Gravitation,
and World Structure” (by E. A. Milne) ............................................ 475
Review of “Theoretical Nuclear Physics” (by J. M. Blatt
and V. F. Weisskopf) ................................................................. 480
(edited by S. Flügge) .................................................................... 483
Review of “Proceedings of the Rehovoth Conference
on Nuclear Structure” (edited by H. J. Lipkin) .................................. 485
Review of “Elements de Physique Nucléaire” (by D. Blanc
and G. Ambrosino) ..................................................................... 487
Review on “Fast Reactor Cross Sections” (by S. Yiftah, D. Okrent,
and P. A. Moldauer) .................................................................... 488
Review of “American Scientists and Nuclear Weapons Policy”
(by R. Gilpin) .............................................................................. 489
Review of “The Inspiration of Science” (by Sir G. P. Thomson) .............. 492
Review of “Nuclear Shell Theory” (by A. de-Shalit and I. Talmi) .......... 494
Review of “The Quantum Theory of Fields: Proceedings of the
1961 Solvay Conference” ................................................................ 496
Review of “Internal Factors in Evolution” (by L. L. Whyte) .................... 498
Review of “Theory of Groups in Classical and Quantum Physics, Vol. I:
Mathematical Structures and the Foundations of Quantum Theory”
(by T. Kahan) .............................................................................. 499
Review of “Of Molecules and Men” (by F. Crick) .................................. 501
Review of “The Role of Mathematics in the Rise of Science”
(by S. Bochner) ............................................................................ 503
Review of “Nuclear War and Nuclear Peace” (by Y. Harkabi) ............... 504
Review of “Formulas and Theorems for the Special Functions
of Mathematical Physics” (by W. Magnus, F. Oberhettinger,
and R. P. Soni) ........................................................................ 505
Review of “Random Matrices and the Statistical Theory of Energy Levels” (by M. L. Mehta) ................................................................. 506
Review of “Reflections on Big Science” (by A. M. Weinberg) ............... 508
Review of “Relaxation in Shock Waves” (by Ye. V. Stupochenko, S. A. Losev, and A. I. Ozipov) .............................................................. 510
Review of “Annual Review of Nuclear Science” (edited by E. Segrè) ......... 512
Review of “Symmetry Discovered: Concepts and Applications in Nature and Science” (by J. Rosen) ................................................................. 515
Review of “The Advisors – Oppenheimer, Teller, and the Superbomb” (by H. York) ................................................................................. 516
Review of “A Perspective of Physics” (selected and edited by Sir Rudolf Peierls) ......................................................................................... 521

Bibliography ....................................................................................... 523
Papers Reprinted in This Volume ......................................................... 523
Papers on Related Topics Reprinted in Other Volumes of The Collected Works ................................................................. 530
Papers on Related Topics Not Reprinted in The Collected Works ........ 531