The Enigmatic Photon

Volume 5: O(3) Electrodynamics

by

Myron W. Evans

Alpha Foundation and Laboratories,
Institute of Physics,
Budapest, Hungary

KLUWER ACADEMIC PUBLISHERS
DORDRECHT / BOSTON / LONDON
Contents

Preface ix

Part I. Electrodynamics as a Gauge Field Theory 1

1. General Gauge Field Theory Applied to Electrodynamics 3

   1.1 Elements of Vector Analysis in the
       Circular Basis ((1), (2), (3)) 7
   1.2 The Electromagnetic Field Tensor in
       O(3) Electrodynamics 14
   1.3 Gauge Transformation in O(3) Electrodynamics 31

2. The Geometry of Gauge Fields 63

   2.1 Application to Electromagnetic Theory
       with Internal Space ((1), (2), (3)) 64
   2.2 The Geometrical Meaning of O(3) Electrodynamics 75
   2.3 The Field Equations of O(3) Electrodynamics 76

3. Field-Matter Interaction 93

   3.1 Introduction 93
   3.2 Classical Non-Relativistic Physics 95
   3.3 Classical Relativistic Physics 98
   3.4 Non-Relativistic Quantum Physics 99
   3.5 Relativistic Quantum Physics 100
   3.6 Raleigh-Schrödinger Perturbation Theory 101
   3.7 Discussion 101
Part II. Historical Development of O(3) Electrodynamics: 
Selected Papers  

1. Ultra Relativistic Inverse Faraday Effect  

2. On the Use of a Complex Vector Potential in the Minimal Prescription in the Dirac Equation  

3. Infinitesimal Field Generators  

4. Note on Radio Frequency Induced N.M.R.  

5. Fundamental Definitions for the Vacuum $B^{(3)}$ Field  

6. Unified Field Theory and $B^{(3)}$  

7. The Physical Meaning of $B^{(3)}$  

8. Relativistic Magneto-Optics and the Evans-Vigier Field  

9. On the Irrotational Nature of the $B^{(3)}$ Field  

10. The Interaction of the Evans-Vigier Field with Atoms
Contents

11. The Derivation of the Majorana Form of Maxwell’s Equations from the B Cyclic Theorem 235

12 The Evans-Vigier Field $B^{(3)}$ Interpreted as a De Broglie Pilot Field 241

13. The Charge Quantization Condition: Link Between the $O(3)$ Gauge Group and the Dirac Equation 255

14. The Evans-Vigier Field, $B^{(3)}$, in Dirac’s Original Electron Theory: a New Theorem of Field-Fermion Interaction 263

15. The Microwave Optical Zeeman Effect Due to $B^{(3)}$ 277

16. $B^{(3)}$ Echoes 285

17. Maxwell's Vacuum Field — a Rotating Charge 295

18. Dipole Model for the Photon and the Evans-Vigier Field 307

19. Electromagnetism in Curved Space-time 317

20. The Cyclic Structure of Vacuum Electromagnetism: Quantization and Derivation of Maxwell’s Equations 323
<table>
<thead>
<tr>
<th>Index</th>
<th>333</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contents, Volume 1</td>
<td>339</td>
</tr>
<tr>
<td>Contents, Volume 2</td>
<td>343</td>
</tr>
<tr>
<td>Contents, Volume 3</td>
<td>345</td>
</tr>
<tr>
<td>Contents, Volume 4</td>
<td>349</td>
</tr>
</tbody>
</table>