

JOURNAL OF NEW ENERGY

An International Journal of New Energy Systems

Vol. 4, No. 1, 1999

THE PHYSICS OF NEW CLEAN ENERGIES AND FUELS ACCORDING TO HADRONIC MECHANICS

By Ruggero Maria Santilli
of the Institute for Basic Research

Published by the
Fusion Information Center
P.O. Box 58639, Salt Lake City, Utah 84158-0639

A Quarterly Journal
Subscription: \$150 for 4 issues, Single issues: \$45



Summer 1999

ISSN 1086-8259

***THE PHYSICS OF
NEW CLEAN ENERGIES AND FUELS
ACCORDING TO HADRONIC MECHANICS ****

Ruggero Maria Santilli

President

The Institute for Basic Research

P. O. Box 1577, Palm Harbor, FL 34682, U.S.A.

ibr@gte.net, <http://home1.gte.net/ibr>

ABSTRACT

This is a series of five papers reporting, in a language accessible to the general scientific audience, systematic research on new energies and fuels conducted at the particle, nuclear, and molecular levels, which were initiated by R. M. Santilli at Harvard University in 1978 under DOE contracts ER-78-S-02-47420.A000, AS02-78ER04742, DE-ACO2-80ER10651; continued by Santilli and several mathematicians, theoreticians, and experimentalists at The Institute for Basic Research and at various other institutions under DOE contracts DE-ACO2-80ER-10651.A001, and DE-ACO2-80ER10651.A002; subsequently continued under financial support by Hadronic Press, Inc., Nonantum, Massachusetts; and more recently completed under logistic and financial support by Troups Technology Licensing, a public company in Largo, Florida. In particular, Troups Technology Licensing permitted the conduction of the important tests and measurements presented in Paper V, which lead to the identification of *new clean energies*, which do not release harmful radiations or leave dangerous waste, as well as *new clean fuels*, which resolve the alarming environmental problems caused by fossil fuels.

**) Copyright © August 26, 1999, by R. M. Santilli*

P. O. Box 1577, Palm Harbor, FL 34682, U.S.A.

Excerpts of this publication are authorized for any scientific uses without the approval by the copyright owner, provided that: 1) This publication and/or preceding ones are quoted; 2) Said quoted publications are outlined as a prerequisite for allegations of novelty; and 3) Original paternities are identified with clarity. No reprints of this publication can be made without the authorization by the copyright owner.

TABLE OF CONTENTS

PAPER I: INSUFFICIENCIES OF QUANTUM MECHANICS, page 10

1. INTRODUCTION, page 10
 - 1.1. The Fundamental Open Problem of the Emerging New Energies, 10
 - 1.2. Definition of New Energies, 13
 - 1.3. Statement of Objectives, 15
2. INSUFFICIENCIES OF QUANTUM MECHANICS IN VARIOUS FIELDS, 16
 - 2.1. Conditions of Validity of a Given Theory, 17
 - 2.2. Insufficiencies of Quantum Mechanics in Atomic Physics, 19
 - 2.3. Insufficiencies of Quantum Mechanics in Nuclear Physics, 21
 - 2.4. Insufficiencies of Quantum Mechanics in Particle Physics, 29
 - 2.5. Insufficiencies of Quantum Mechanics in Superconductivity, 32
 - 2.6. Insufficiencies of Quantum Mechanics in Gravitation, Astrophysics and Cosmology, 33
 - 2.7. Insufficiencies of Quantum Mechanics in Chemistry, 33
 - 2.8. Insufficiencies of Quantum Mechanics in Biology, 36
3. INSUFFICIENCIES OF SPECIAL AND GENERAL RELATIVITIES, 38
 - 3.1. Statement of Objectives, 38
 - 3.2. Insufficiencies of Special Relativity, 38
 - 3.3. Inconsistencies of General Relativity, 40

PAPER II: THE NEW MECHANICS, 46

1. INTRODUCTION, 46
2. ORIGINS OF THE INSUFFICIENCIES OF QUANTUM MECHANICS, 49
3. THE "MAJESTIC" AXIOMATIC CONSISTENCY OF QUANTUM MECHANICS, 50
4. CATASTROPHIC INCONSISTENCY OF BROADER THEORIES BASED ON CONVENTIONAL MATHEMATICS, 52
5. THE NOVEL ISO-, GENO- AND HYPER-MATHEMATICS AND THEIR ISODUALS, 56
6. CLASSICAL AND OPERATOR ISO-, GENO-, AND HYPER-MECHANICS, 61
 - 6.1. Introduction, 61
 - 6.2. Nonrelativistic Classical Isomechanics, 62
 - 6.3. Nonrelativistic Isoquantization, 63
 - 6.4. Nonrelativistic Isomechanics, 64
 - 6.5. Relativistic Isomechanics, 71
 - 6.6. Geno- and Hyper-mechanics, 71
7. ISO-, GENO-, HYPER-RELATIVITIES AND COSMOLOGIES, 74
8. ISO-, GENO-, AND HYPER-CONDUCTIVITY, 79

9. ISO-, GENO- AND HYPER-CHEMISTRY, 80**10. SIMPLE CONSTRUCTION OF CLASSICAL AND OPERATOR GENERALIZED THEORIES, 80****PAPER III: NEUTRON STRUCTURE AND NEW ENERGIES OF CLASS I, 84****1. CLASSIFICATION OF NEW ENERGIES, 84****2. EXPERIMENTAL VERIFICATIONS OF HADRONIC MECHANICS IN PARTICLE PHYSICS, ASTROPHYSICS, AND COSMOLOGY, 87**

2.1. Statement of Objectives, 87

2.2. Insufficiencies of Special Relativity and the Universality of its Isotopic Covering, 87

2.3. Experimental Verification with Data on the Local Speed of Light, 88

2.4. Experimental Verifications Via Phenomenological Calculations of Hadronic Media, 90

2.5. Experimental Verification with the Behavior of the Meanlife of Unstable Hadrons with Speed, 91

2.6. Experimental Verification Via Data on the Bose-Einstein Correlation, 95

2.7. Experimental Verifications in Gravitation, 99

2.8. Experimental Verifications in Astrophysics, 101

2.9. Experimental Verifications in Cosmology, 104

3. THE NEW STRUCTURE MODEL OF HADRONS WITH PHYSICAL CONSTITUENTS, 106

3.1. Statement of Objectives, 106

3.2. The Forgotten Legacy of Rutherford, 107

3.3. Hadronic Two-Body Bound States, 109

3.4. The Structure Model $\pi^0 = (e^+, e^-)_{HM}$, 1143.5. The Structure Model $n = (p^+, e^-)_{HM}$, 117

3.6. Don Borghi's Verifications of the Synthesis of the Neutron from Protons and Electrons, 123

3.7. Compatibility of the New Structure Model of Hadrons with SU(3)-Color Classification, 125

4. APPLICATION TO NEW ENERGIES OF CLASS I, 127

4.1. The Stimulated Decay of the Neutron, 127

4.2. Hadronic Energy (Copyrighted and Patent Pending), 129

4.3. Tsagas' Experimental Verification of Hadronic Energy, 133

4.4. Application to the Stimulated Decay of Nuclear Waste (Copyrighted and Patent Pending), 135

4.5. Physical Laws of New Energies of Class I (Copyrighted and Patent Pending), 137

5. PROPOSED NEW EXPERIMENTS FOR NEW ENERGIES, 138**PAPER IV: STRUCTURE OF NUCLEI AND NEW ENERGIES OF CLASS II, 143****1. INTRODUCTION, 143**

1.1. Statement of Objectives, 143

1.2. Lack of Exact Character of Quantum Mechanics in Nuclear Physics, 146

1.2.1. Insufficiencies of quantum mechanics for the nuclear force, 146

- 1.2.2. Insufficiencies of quantum mechanics for the nuclear structure, 147
- 1.2.3. Insufficiencies of quantum mechanics for the representation of nuclear magnetic moments, 148
- 1.2.4. Insufficiencies of quantum mechanics for the representation of other nuclear data, 149
- 1.2.5. Insufficiencies of quantum mechanics for the representation of dissipative nuclear reactions, 150
- 1.3. Primary Reasons for the Insufficiencies of Quantum Mechanics and the Selection of a Covering Theory, 150

2. APPLICATIONS AND VERIFICATIONS OF HADRONIC MECHANICS IN NUCLEAR PHYSICS, 153

- 2.1. Main Structural Lines, 153
- 2.2. Reconstruction of the Exact Isospin Symmetry, 155
- 2.3. Exact Representation of Total Nuclear Magnetic Moments, 158
 - 2.3.1. The historical hypothesis, 159
 - 2.3.2. Incompatibility of the historical hypothesis with the special relativity, 159
 - 2.3.3. Compatibility of the historical hypothesis with the isospecial relativity, 160
 - 2.3.4. The isodirac equation, 161
 - 2.3.5. Conventional values of angular momentum and spin, yet mutated magnetic moments, 162
 - 2.3.6. Exact representation of the deuteron magnetic moment, 163
 - 2.3.7. Exact representation of all remaining nuclear magnetic moments, 165
- 2.4. Exact Representation of Rauch's 4π Interferometric Measurements, 165
- 2.5. Hadronic Model of the Deuteron Structure, 171
 - 2.5.1. Conceptual foundations for nuclei, 171
 - 2.5.2. Conceptual foundations for the deuteron, 171
 - 2.5.3. Deuteron stability, 173
 - 2.5.4. Deuteron size, 173
 - 2.5.5. Deuteron charge, 174
 - 2.5.6. Deuteron spin, 175
 - 2.5.7. Deuteron force, 176
 - 2.5.8. Deuteron binding energy, 178
 - 2.5.9. Deuteron total energy, 178
 - 2.5.10. Deuteron magnetic moment, 180
 - 2.5.11. Deuteron electric dipole moment and parity, 181
- 2.6. Nuclear Forces, 181
- 2.7. Nuclear Models, 182

3. PHYSICAL LAWS OF NEW ENERGIES OF CLASS II AS PREDICTED BY HADRONIC MECHANICS, 182

- 3.1. Basic Equations for stimulated Nuclear Transmutations, 182
- 3.2. Physical Laws of New Energies of Class II (Copyrighted and Patent Pending), 188
- 3.3. The Hadronic Lithium Reactor (Copyrighted and Patent Pending), 190
- 3.4. The Hadronic Helium Reactor (Copyrighted, Patent Pending), 195
- 3.5. The Hadronic Nitrogen Reactor (Copyrighted and Patent Pending), 198
- 3.6. Hadronic Reactor to Synthesize Natural Element (Copyrighted and Patent Pending), 202
- 3.7. concluding remarks, 202

PAPER V: STRUCTURE OF MOLECULES, NEW CLEAN FUELS, AND NEW CLEAN, ENERGIES OF CLASS III, 205

1. **INTRODUCTION**, 206
 - 1.1. Statement of Objectives, 206
 - 1.2. Major Environmental Problems Addressed by Toups Technology Licensing, 207
 - 1.4. Hadronic Mechanics, Superconductivity, and Chemistry, and the New, 212
Model of Electron Bonding, 215
 - 1.5. The New Chemical Species of Magnecules, 222
2. **EXPERIMENTAL VERIFICATION OF HADRONIC MECHANICS IN SUPERCONDUCTIVITY AND CHEMISTRY**, 228
 - 2.1. Conceptual Foundations of Electron Bonding and Clustering, 228
 - 2.2. Basic Equations for Electron Bonding and Clustering, 231
 - 2.3. Experimental Verifications in Superconductivity, 235
 - 2.4. Experimental Verifications in the Hydrogen Molecule, 239
 - 2.5. Experimental Verification in the Water Molecule, 245
3. **NEW COMBUSTIBLE GASES RESOLVING THE ALARMING ENVIRONMENTAL PROBLEMS CAUSED BY FOSSIL FUELS DEVELOPED AT TOUPS TECHNOLOGY LICENSING (COPYRIGHTED AND PATENT PENDING)**, 249
 - 3.1. Creation of Magnecules in Gases, 249
 - 3.2. Definition of Magnecules and their Anomalies (Copyrighted and Patent Pending), 251
 - 3.3. Necessary Conditions for the Detection of Magnecules (Copyrighted and Patent Pending), 253
 - 3.4. Spectroscopic Evidence of Magnecules in Gases. (Copyrighted and Patent Pending), 255
 - 3.5. Origin of Anomalous Energy Content (Copyrighted and Patent Pending), 269
 - 3.6. Creation of Magnecules in Liquids (Copyrighted and Patent Pending), 270
 - 3.7. Photographic Evidence of Magnecules in Liquids (Copyrighted and Patent Pending), 271
 - 3.8. Spectroscopic Evidence of Magnecules in Liquids (Copyrighted and Patent Pending), 271
 - 3.9. Experimental Verification of Mutated Physical Characteristics (Copyrighted and Patent Pending), 274
 - 3.10. Evidence of magnecules in solids (Copyrighted and Patent Pending), 282
 - 3.11. Industrial Applications of the New TTL Technology of Magnetically Polarized Substances (Copyrighted and Patent Pending), 282
 - 3.12. The New TTL MagneGas™ Resolving the Alarming Environmental Problems Caused by Fossil Fuel (Copyright, TradeMark, and Patent Pending), 283
4. **NEW CLEAN ENERGIES OF CLASS III**, 287
 - 4.1. Introduction, 287
 - 4.2. Physical Laws of New Energies of Class III (Copyrighted and Patent Pending), 288
 - 4.3. Application of Hadronic Mechanics to the Electromagnetically Pinched, 289
Deuterium Energy (Copyrighted and Patent Pending), 289
 - 4.4. Application of Hadronic Mechanics to Cold Fusion (Copyrighted and Patent Pending), 292
 - 4.5. Application of Hadronic Mechanics to Mills' Blacklight (Copyrighted and Patent Pending), 304

5. CONCLUDING REMARKS, 307

ACKNOWLEDGMENTS, 308

BIOGRAPHICAL NOTES OF R. M. SANTILLI