

An unification scheme for classical and quantum mechanics at all velocities (I)

J. X. Zheng-Johansson^{1,*}

¹*Stockholmsvägen 14, 611 37 Nyköping, Sweden* †

(Dated: June, 2000 - August 28, 2002)

(* CONFIDENTIAL * READ BY PROF BÖRJE JOHANSSON ONLY)

Abstract

Based on pivotal experimental indications we first depict the *microscopic structure of the vacuum medium*, which comprises substantial entities termed as the familiar *aethers*, and *the law of the motion of the electromagnetic waves*, which consistently obeys the Galilean transformation. This facilitates a *general scheme* for the microscopic formation of a material particle, which we thereupon carry out. We infer that, given the disturbance of a bare charge – an *aether-pole*, as a direct result of the Newtonian-mechanics solution of equations of motion of the aethers in the vacuum medium, a (basic) material particle evolves thereby into existence. The particle may be an electron, a proton, or an anti-particle of either; or a "photon" and a "phonon" if associated with the detached waves. The resulting particle has an *inertial mass*, *electric charge* and *basic size*, as well as a built-in scheme for spin to be implemented in a separate paper, conforming to the experimental exhibitions. Meanwhile, the resulting particle is from its formation generically a de Broglie wave, here called a *Newton-de Broglie (particle) wave*, resulting from a *first kind source effect*. This particle wave at low velocities generically obeys Newtonian wave mechanics which, as combined with the NdB particle wave, identifies with Schrödinger's quantum mechanics. At higher velocities, the governing law converges to Newtonian mechanics for particles. We hitherto accomplish a basic part of the task of the *unification of the classical and the quantum- mechanics*, both in terms of the deduction of the latter from the former, and in terms of the convergence of the latter into the former in a high kinetic regime. Through this *general scheme*, the origin and the nature of a series of fundamental phenomena and empirical notions, to-date yet unexplained, unfold themselves naturally. These include the nature of the *electromagnetic waves*, the origin of *inertial mass*, the nature of *radiation*, *absorption* and *excitations*, the origin of the de Broglie wave and Schrödinger's wave function, the origin of Heisenberg's uncertainty relation, etc. Through this *general scheme*, a series of fundamental relations and rules, already formulated by quantum mechanics and other contemporary physics as phenomenological laws and demonstrated by experiments, evolve into existence naturally, these including the *de Broglie relations*, the *simultaneous existence of electron and positron* or, generally, of *particles and their anti-particles*, the *(rest) mass energy equivalence principle*, the *uncertainty relation*, etc. As a separate but correlated context, we further infer that, the very *general scheme* leads to also a *second kind source effect*, which results in augmentation by a factor $\gamma = 1/\sqrt{1 - v^2/c^2}$ in the inertial mass, the wavevector and frequency of the constituent waves, etc. of a particle moving at the velocity in the v -direction; and conversely for their reciprocal properties. In a body composed of these particles, this accordingly leads to a *simultaneous length and time contractions* as measured in the frame in which the body resides. This, combined with

the Galilean transformation, leads to a set of coordinate transformation equations between an inertial reference frame at rest (in vacuum) and one moving relative to it, called *Galileo-Lorentz transformation*. The content of this separate context gives rise to a consistent *theory of relative motion*. With the theory, the unified classical and quantum mechanics are thereby both vigorously expressed at velocities comparable to c . Employing the theory of relative motion, which in turn justifies the theory itself, we predict the experimentally observed null-fringe shift result of the Michelson-Morley experiment, the Doppler effects and particle dynamics at $v \sim c$.

PACS numbers:

Contents

| | |
|--|----|
| I. Introduction | 6 |
| II. Experimental indication of the dependence of light velocity on the motion of the observer and the substantial property of vacuum | 7 |
| A. The experimental indication of the dependence of light velocity on the motion of observer | 9 |
| B. Experimental indication of the substantial property of vacuum | 11 |
| C. The law of relative motion of electromagnetic waves: Proposition 1 | 13 |
| III. An unification scheme for classical and quantum mechanics | 13 |
| A. The properties of vacuum: Propositions 2-3 | 13 |
| B. Material particle at rest: its formation from a localized charge in vacuum as governed by Newtonian mechanics | 18 |
| 1. The forced oscillation of the aether particles and the resultant electromagnetic wave trains | 19 |
| 2. The frequency and the modes of the travelling electromagnetic wave train | 21 |
| 3. The total energy of the electromagnetic wave train | 22 |
| 4. The rest-mass of a material particle, its equivalence to the viscose resistance to the oscillation of the aether-pole, or equivalently to the motion of the electromagnetic wave train | 25 |
| 5. The origin of inertial mass | 26 |
| 6. The origin of size of a basic particle | 27 |
| 7. The energy and inertial mass relation of a material particle | 28 |
| 8. Semi-empirical expressions for Planck's constant and de Broglie wave length | 28 |
| 9. Concluding remarks of Sec. III B | 30 |
| C. Material particle in motion: its formation from a moving charge in vacuum into a particle wave as governed by Newtonian (wave) mechanics, which is equivalent to the Schrödinger's wave mechanics | 30 |
| 1. The first kind source effect on a particle in motion | 30 |
| 2. Moving particle confined in a one-dimensional box, the single particle Newton-de Broglie wave | 31 |
| 3. Electron orbiting about nucleus in a hydrogen-like atom | 39 |
| 4. Photons and the nature of thermal excitation related processes | 41 |

| | |
|--|----|
| 5. General implication: the governing mechanics of particle motion identifies with the Schrödinger's quantum mechanics | 42 |
| D. The dynamics of a particle moving at high velocities: the classical limit | 44 |
| IV. The Theory of Relative Motion | 46 |
| A. A second kind source effect on the dynamic property of a moving material particle as inferred from Newtonian mechanics | 46 |
| B. The dynamic mass-energy equivalence relation inferred from Newtonian wave mechanics | 48 |
| C. Second kind source effect on the NdB wave properties of a single material particle in motion | 49 |
| D. Second kind source effect on the size of a single material particle in motion | 49 |
| E. Second kind source effect carried on to a moving material body | 52 |
| F. The Galilean-Lorentz Transformation (GLT) – the Galilean Transformation with the second kind source effect incorporated | 53 |
| 1. Intermediate coordinate transformations | 53 |
| 2. Coordinate transformation between relatively moving observers | 55 |
| G. The GLT applied to light wave traversing between two points fixed on a spacing device | 56 |
| 1. General variant cases | 56 |
| 2. The Michelson-Morley Experiment as special case: a null-fringe shift is predicted | 59 |
| H. Dynamics of a material particle | 59 |
| I. Doppler effect with the second kind source effect incorporated | 60 |
| A. The energy - mometum relation of electromagnetic wave | 63 |
| B. The non-classical, second kind source effect derived in terms of wave parameters | 65 |
| C. Light traversing a closed loop: the classical spacing-device motion effect | 67 |
| D. Incremental mass due to the particle's incremental thermal velocity | 70 |
| E. A quantitative estimation of the total length JL of the electromagnetic wave train | 70 |

| | |
|--|----|
| F. Dimension contraction of a body in motion as a result of the contraction of its constituent particles, a discussion from the established approaches in condensed matter physics | 73 |
| G. Motion of the nucleus-electron system in the centre-of-mass coordinate | 74 |
| References | 77 |
| VIII. aether- 3 d oscillation model | 80 |
| IX. traveling de Broglie wave in X - coordinates | 80 |
| X. Discussion of the de Broglie wave at high v | 80 |
| XI. The frequency and the modes of the standing electromagnetic wave train | 80 |
| XII. Waves generated by charges travelling in opposite directions | 81 |
| XIII. Simultaneous, oppositely travelling waves generated by an oscillating charge (FIG. only) | 82 |
| XIV. Comments on the inner inconstancy of Einstein's special relativity theory | 82 |
| I. INTRODUCTION | |

The IED particle model and vacuum structure described here are in the final form. Some views, terms and ways of introductions are not updated or out of dated. Regarding their updated editions recent publications are to be referred to. /JXZJ, 2010-06-04.