WEBER ELECTRODYNAMICS: PART III. MECHANICS, GRAVITATION

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Weber electrodynamics predicts the Kaufmann-Bucherer experiments and the fine structure energy level splitting of the H-atom (neglecting spin) without mass change with velocity (i.e., mass $\neq m_0/\sqrt{1 - v^2/c^2}$). The Weber potential for the gravitational case yields Newtonian mechanics, confirming Mach's principle. It provides a cosmological condition yielding an estimated radius of the universe of $8 \times 10^9$ light years. Despite these successes, the independent evidence for Kaufmann mechanics, where mass changes with velocity (i.e., mass $= m_0/\sqrt{1 - v^2/c^2}$) is convincing. Perhaps a slight alteration may make the Weber theory compatible with Kaufmann mechanics.

Key words: electrodynamics, Weber theory, Kaufmann experiment, Mach's principle confirmed, radius of universe, Kaufmann mechanics evidence for.

1. INTRODUCTION

This is part III of a review paper presented in three parts. Part I (Found. Phys. Lett. 3, 443 (1990)) presents the general Weber theory extended to fields and the supporting evidence for slowly varying effects. Part II (Found. Phys. Lett. 3, 471 (1990)) presents Weber theory for unipolar induction experiments and the determination of the zero torque on the Pappas-Vaughan Z-antenna, results not explained by Maxwell theory. The present part III shows that
the Weber theory predicts the Kaufmann-Bucherer experiments and the fine structure energy level splitting of the H-atom (neglecting spin) without mass change with velocity. When applied to gravitation the Weber theory yields Newtonian mechanics, confirming Mach's principle. It provides a cosmological condition yielding an estimated radius of the universe of $8 \times 10^9$ light years. The independent evidence for Kaufmann mechanics, where the mass changes with velocity, is convincing. (The designation "relativistic mechanics" is avoided here; as it is not historically accurate; and it implies an endorsement of "special relativity".)

The Weber theory [1] is based upon a potential for a charge $q$ at $r$ and a charge $q'$ at $r'$; thus,

$$ U = (qq'/R)\left[1 - (dR/dt)^2/2c^2\right], \quad (1) $$

where $R = |r - r'|$ is the separation distance. The Weber force $F_W$ is obtained from Eq.(1) by differentiation; thus,

$$ dU/dt = - \mathbf{V} \cdot \mathbf{F}_W, \quad (2) $$

where $\mathbf{V}$ is the relative velocity $\mathbf{V} = \mathbf{v} - \mathbf{v}'$, and

$$ \mathbf{F}_W = (qq'R/R^3)\left[1 + V^2/c^2 - 3(R \cdot \mathbf{V})^2/2c^2R^2 + R \cdot d\mathbf{V}/dtc^2\right]. \quad (3) $$

2. THE WEBER VELOCITY SQUARED FORCE

The Weber velocity squared force involves the force between a stationary charge $q$ at $r$ and a negative charge $-q'$ moving with a steady velocity $\mathbf{v}'$ at $r'$ in a conductor where the net charge is zero; thus, from Eq.(3)

$$ \mathbf{F}_W = - (qq'R/c^2R^3)\left[\mathbf{v}'^2 - 3(R \cdot \mathbf{v}')^2/2R^2\right]. \quad (4) $$

One of the early objections to the Weber theory was the fact that this velocity squared force, Eq.(4), had never been observed. One cannot arbitrarily remove this force; because it is required for the conservation of energy. The force is needed to derive the Weber force from a velocity potential. To remove this problem Fechner [2] hypothesized that currents consisted of positive charges flowing in one direction with an equal flow of negative charges in the opposite direction. Today it is known that this hypothesis is false; as it is only the negative electrons that flow in a wire.

To discredit the Weber theory the proponents [3] of