ETA Theory: A Programmatic Two-Field Framework for Emergent Electromagnetism, Localized Matter, Hydrogenic Structure, and a Prospective Gravitational Sector

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Abstract

ETA theory is a programmatic field-theoretic framework in which electromagnetism, photon propagation, localized matter, hydrogenic bound structure, and a possible gravitational sector are treated as different dynamical regimes of an underlying space-time system. The framework introduces two basic fields: a charge-separation field $\Psi_c(x^\mu)$ and a mass-localization field $\Psi_m(x^\mu)$, coupled through a nonlinear interaction Lagrangian. In the weak-field regime, a covariant completion is proposed in which Maxwell-form equations arise as an effective limit. In the localized regime, coupled configurations of the two fields are interpreted as candidate matter-like states, although the minimal static two-scalar model is shown not to support nontrivial finite-energy localized solutions in three spatial dimensions. At the atomic level, the framework reproduces the standard hydrogenic gross spectrum at the level of an effective standing-field reduction and provides an interpretive basis for viewing bound states as phase-closed field configurations rather than point-particle orbits. The manuscript also discusses double-slit interference in process-based terms, distinguishes the ETA medium concept from a mechanical ether, and outlines a speculative extension in which matter is interpreted as condensed space-time and gravity as the large-scale response of space-time to that condensation. The paper is intended not as a completed replacement for standard quantum electrodynamics or gravitation, but as a structured research program with explicit equations, effective reductions, limitations, and concrete derivational targets.

Contents

1. Introduction

Modern physics describes electromagnetic and quantum phenomena with extraordinary empirical success, yet it does so through several formalisms that are usually introduced separately. Classical electrodynamics describes radiation through fields and sources, quantum theory introduces wavefunctions and operators, relativistic wave equations account for spin, and precision radiative effects are treated through quantum field theory. ETA theory is an attempt to investigate whether some of these structures may be understood as effective descriptions arising from a deeper common field-theoretic substrate.

The central working hypothesis of ETA is that space-time possesses at least two fundamental dynamical capacities: a capacity for charge separation and a capacity for mass-energy localization. These are represented by a charge-separation field $\Psi_c(x^\mu)$ and a mass-localization field $\Psi_m(x^\mu)$. The theory then asks whether propagating radiation-like states, localized matter-like states, and hydrogenic bound structure can be understood as different solution classes of a coupled nonlinear system built from these two fields.

In this sense, ETA is best read as a research program rather than as a completed alternative to established theory. Some parts of the framework are comparatively conservative: a clear two-field Lagrangian may be written down, a weak-field covariant completion may be proposed, and standard hydrogenic gross structure may be recovered at the level of an effective standing-field reduction. Other parts remain incomplete and are presented here as open targets rather than finished results: construction of stable localized electron-like branches, derivation of effective spinorial behavior, first-principles precision spectroscopy, and a full gravitational completion.

The interpretive motivation of the program is nevertheless unified. In ETA, propagation and localization are not treated as distinct kinds of substance, but as distinct dynamical regimes of one deeper field system. Photons are interpreted as propagating excitations of the separation sector, matter-like states as organized localized configurations of the coupled fields, and atomic bound structure as a phase-consistent standing-field regime. A further extension, discussed here only programmatically, is that matter may be interpreted as a condensed phase of space-time itself, with gravity arising as the large-scale response of the substrate to that condensation.

The purpose of this manuscript is therefore twofold. First, it presents the ETA framework in a compact research style with explicit assumptions, governing equations, effective reductions, and internal consistency conditions. Second, it separates the conservative core of the program from its speculative extensions, so that the theory may be evaluated in terms of what is already formulated, what is only effectively reproduced, and what remains to be derived.

2. Overview of the ETA Program

ETA begins from the hypothesis that the observed electromagnetic and material world is not fundamental in its usual textbook form. Instead, electric and magnetic behavior is interpreted as an emergent effective description of deeper field properties of space-time itself. The core idea is that space-time possesses an intrinsic capacity for charge separation and for mass localization. Organized patterns in those fields then appear to us as photons, electrons, bound atomic states, and perhaps, in a future extension, gravitational structure.

This proposal is ambitious because it seeks to unify phenomena that are normally introduced separately. In standard pedagogy, classical electromagnetism begins with fields and sources, quantum theory introduces wavefunctions and operators, relativistic wave equations account for spin, and quantum electrodynamics addresses radiative corrections. ETA instead tries to cast these as distinct regimes of one deeper field dynamics. In that sense, the program is not merely interpretive; it is architectural. It aims to place radiation, localized matter, bound structure, and higher-order corrections inside one field-theoretic language.

The theory is built around two principal fields:

- a charge-separation field $\Psi_c(x^\mu)$, representing the local degree to which space-time is polarized into complementary charge-like regions, and

- a mass-localization field $\Psi_m(x^\mu)$, representing the local degree to which energy is confined or localized.

The first field underlies what later appears as electric and magnetic structure. The second underlies inertial and matter-like localization. Coupled configurations of the two fields are then interpreted as particles or bound structures.

A crucial philosophical move occurs immediately. In ETA, electric charge is not necessarily primary. Rather, the field Ψ_c describes the state of separation from which effective charge densities emerge. Likewise, mass is not introduced as an irreducible point property, but through Ψ_m as a condition of localized energy density. This shifts the ontology from particles carrying intrinsic labels to structured field configurations whose organization gives rise to the labels we measure.

The theory makes room for several layers of description:

1. a fundamental nonlinear field level,

2. an effective weak-field level in which Maxwell-like equations emerge,

3. localized standing-wave sectors interpreted as matter,

4. propagating-wave sectors interpreted as radiation,

5. and, in a possible extension, a gravitational sector associated with the organization of the localization field.

This layering is one of ETA's attractive conceptual features because it suggests that familiar distinctions such as "field" versus "particle" or "radiation" versus "matter" might be differences of solution class rather than differences of ontology.

3. Postulates and Conceptual Foundations

The ETA framework may be stated compactly as a set of working postulates.

Postulate 1 (Charge-separation capacity of space-time)**.** *Space-time possesses a local dynamical degree of freedom* $\Psi_c(x^\mu)$ *that measures the extent to which an initially neutral substrate is polarized into complementary charge-like regions.*

Postulate 2 (Mass-localization capacity of space-time)**.** *Space-time possesses a second dynamical degree of freedom* $\Psi_m(x^\mu)$ *that measures the extent to which energy is localized into stable matter-like structures.*

Postulate 3 (Common dynamics)**.** *Propagating electromagnetic phenomena and localized matter are different classes of solutions of one coupled field theory involving* Ψ_c *and* Ψ_m*.*

Postulate 4 (Emergent electromagnetism)**.** *The observable electric and magnetic fields are effective quantities constructed from the organization of the separation sector and its weak-field completion, not ontologically primary fields.*

Postulate 5 (Bound-state quantization by self-consistency)**.** *Discrete atomic structure arises because only certain standing field configurations satisfy global phase closure and energetic stability conditions.*

These postulates should be read not as proven statements but as the axiomatic core of the theory. The mathematical chapters show what follows if they are assumed.

Several conceptual consequences follow immediately. First, the theory is not fundamentally particle-first; it is structure-first. Second, the difference between propagation and localization becomes dynamical rather than ontological. Third, quantization is expected to emerge from stability classes and closure conditions rather than being imposed externally as a separate rule. Finally, the vacuum or background of the theory is not merely empty geometric stage space; it already contains the capacity for organized separation and localization.

4. Mathematical Formulation of the ETA Fields

The minimal source model proposes the following coupled-field Lagrangian density:

$$\mathcal{L} = \frac{1}{2}\partial_\mu\Psi_c\partial^\mu\Psi_c - \frac{\lambda}{4}(\Psi_c^2 - a^2)^2 + \frac{1}{2}\partial_\mu\Psi_m\partial^\mu\Psi_m - \frac{1}{2}\mu^2\Psi_m^2 - \frac{\beta}{4}\Psi_m^4 - \frac{\gamma}{2}\Psi_c^2\Psi_m^2. \tag{1}$$

Each term carries an intended physical role. The first kinetic term controls propagation of the charge-separation field through space-time. The second kinetic term does the same for the mass-localization field. The quartic double-well term

$$-\frac{\lambda}{4}(\Psi_c^2 - a^2)^2$$

encodes spontaneous charge separation: the theory favors configurations in which Ψ_c is driven away from zero toward nonzero separated states. The terms in Ψ_m,

$$-\frac{1}{2}\mu^2\Psi_m^2 - \frac{\beta}{4}\Psi_m^4,$$

provide the nonlinear self-structure needed for matter-like localization. Finally, the coupling

$$-\frac{\gamma}{2}\Psi_c^2\Psi_m^2$$

links separation and localization, allowing charge-like and mass-like organization to bind into one composite structure.

Applying the Euler–Lagrange equations to (1) gives

$$\partial_\mu\partial^\mu\Psi_c + \lambda(\Psi_c^2 - a^2)\Psi_c + \gamma\Psi_c\Psi_m^2 = 0, \tag{2}$$

$$\partial_\mu\partial^\mu\Psi_m + \mu^2\Psi_m + \beta\Psi_m^3 + \gamma\Psi_c^2\Psi_m = 0. \tag{3}$$

These are the master equations of the ETA field theory in its minimal form.

One may also define the potential energy density

$$V(\Psi_c, \Psi_m) = \frac{\lambda}{4}(\Psi_c^2 - a^2)^2 + \frac{1}{2}\mu^2\Psi_m^2 + \frac{\beta}{4}\Psi_m^4 + \frac{\gamma}{2}\Psi_c^2\Psi_m^2, \tag{4}$$

so that the static energy functional formally becomes

$$E[\Psi_c, \Psi_m] = \int_{\mathbb{R}^3} \left[\frac{1}{2}(\nabla\Psi_c)^2 + \frac{1}{2}(\nabla\Psi_m)^2 + V(\Psi_c, \Psi_m)\right] d^3x. \tag{5}$$

4.1. Interpretation of the Two Fields

The field Ψ_c is not ordinary charge density. Rather, it encodes the local state of polarization or separation from which effective charge distributions later emerge. It is best thought of as a generalized order parameter. When $\Psi_c = 0$, space-time is treated as remaining in an undifferentiated neutral state. When $\Psi_c \neq 0$, the substrate is locally polarized into complementary regions that later behave like positive and negative structure.

The field Ψ_m measures the degree to which energy is localized. It is thus the field responsible for matter-like persistence, confinement, and inertia. In the source material, stable coupled structures of Ψ_c and Ψ_m are proposed as the ontological basis for particles such as the electron.

The coupling term $\Psi_c^2\Psi_m^2$ is therefore essential: it binds charge-like and mass-like organization into a single composite state.

Remark 1. *At the level of the minimal model, the existence of physically acceptable particle-like solutions is not proven merely by writing down* (2)–(3)*. Existence, stability, regularity, and the correct asymptotic charges would all need to be demonstrated separately.*

5. Weak-Field Sector and Emergent Electromagnetism

The weak-field regime is the point at which ETA must interface most directly with established electrodynamics. The role of this section is therefore modest but essential: not to claim that electromagnetism has already been derived uniquely from the full nonlinear theory, but to exhibit a mathematically consistent effective completion in which Maxwell-form structure is recovered in an appropriate limit. In this sense, the weak-field construction should be read as an effective sector compatible with the deeper ETA interpretation, rather than as its final microscopic derivation.

In the earliest scalar presentation one writes heuristic effective fields in terms of the separation order parameter Ψ_c. That idea is useful as motivation, but by itself it is not sufficient to recover the full tensorial structure of Maxwell theory.

Proposition 1. *A scalar-only weak-field ansatz for electromagnetism cannot, by itself, reproduce the full Maxwell field tensor. In particular, if Ψ_c is a true scalar, then any magnetic definition of the schematic form $\mathbf{B} \propto \nabla \times (\partial_t \Psi_c)$ vanishes identically because $\nabla \times (\partial_t \Psi_c) = \partial_t (\nabla \times \Psi_c) = 0$.*

Accordingly, a mathematically consistent weak-field completion promotes the propagating separation sector to a four-potential-like field $P_\mu = (P_0, \mathbf{P})$ and defines the effective field tensor by

$$F_{\mu\nu}^{\text{eff}} = \partial_\mu P_\nu - \partial_\nu P_\mu. \tag{6}$$

The observable electric and magnetic fields are then identified in the standard way,

$$E_i = -\partial_i P_0 - \partial_t P_i, \qquad B_i = \epsilon_{ijk} \partial_j P_k. \tag{7}$$

In this formulation the scalar field Ψ_c is regarded as the deeper order parameter underlying charge separation, while P_μ is the effective weak-field variable that carries the full propagating electromagnetic structure.

5.1. Weak-Field Action and Field Equations

A minimal weak-field action consistent with the Maxwell limit is

$$\mathcal{L}_{\text{weak}} = -\frac{1}{4} F_{\mu\nu}^{\text{eff}} F_{\text{eff}}^{\mu\nu} + J_{\text{eff}}^{\mu} P_\mu, \tag{8}$$

where J_{eff}^{μ} is an effective current generated by the underlying ETA medium in the weak-field regime.

Variation with respect to P_ν gives

$$\partial_\mu F_{\text{eff}}^{\mu\nu} = J_{\text{eff}}^{\nu}. \tag{9}$$

Because the tensor in (6) is defined as an exterior derivative, the homogeneous equations follow identically from the Bianchi identity,

$$\partial_\alpha F_{\beta\gamma}^{\text{eff}} + \partial_\beta F_{\gamma\alpha}^{\text{eff}} + \partial_\gamma F_{\alpha\beta}^{\text{eff}} = 0. \tag{10}$$

In three-vector language, (9) and (10) are equivalent to

$$\nabla \cdot \mathbf{E} = \rho_{\text{eff}}, \qquad \nabla \times \mathbf{B} - \partial_t \mathbf{E} = \mathbf{J}_{\text{eff}}, \tag{11}$$

$$\nabla \cdot \mathbf{B} = 0, \qquad \nabla \times \mathbf{E} + \partial_t \mathbf{B} = 0. \tag{12}$$

6. Source-Free Wave Limit and Photon Sector

Within ETA, the photon is interpreted not as a classical point particle and not merely as a classical sinusoidal field, but as a propagating excitation of the charge-separation sector. In the earlier language of the framework this was described as an Origin–Division–Union (ODU) process: a traveling cycle in which a locally neutral background is driven into organized separation and then back into recombination. In the present manuscript, that interpretive picture is retained, while the mathematically controlled presentation is given through the weak-field covariant sector.

The intended claim is therefore interpretive and structural rather than exclusionary. ETA does not deny the empirical validity of the standard photon description in quantum electrodynamics; rather, it proposes that the familiar weak-field photon may admit a deeper process-based reading in terms of organized propagation in the underlying medium.

In the source-free regime $J^{\mu}_{\text{eff}} = 0$, and in Lorenz gauge $\partial_\mu P^\mu = 0$, equation (9) reduces to

$$\partial_\mu \partial^\mu P_\nu = 0. \tag{13}$$

This admits plane-wave solutions of the form

$$P_\mu(x) = \epsilon_\mu e^{ik\cdot x}, \qquad k^\mu k_\mu = 0, \qquad k^\mu \epsilon_\mu = 0. \tag{14}$$

The null dispersion relation and transversality condition are exactly those of the ordinary Maxwell photon in vacuum. Within ETA, such modes are interpreted as weak-field propagating excitations of the deeper charge-separation medium.

6.1. Ellipsoidal Charge-Separation Ansatz for a Photon Mode

To preserve the original geometric intuition of ETA while remaining within the controlled weak-field framework, one may model a photon not as an exact pointlike object but as a localized propagating wavepacket of charge separation with ellipsoidal level sets. A simple ansatz is

$$P_\mu(x) = \text{Re}\left\{\epsilon_\mu A(x,t) e^{i(kz-\omega t)}\right\}, \qquad \omega = ck, \qquad k^\mu \epsilon_\mu = 0, \tag{15}$$

with slowly varying envelope

$$A(x,t) = A_0 \exp\left[-\frac{(z-vt)^2}{2L_\parallel^2} - \frac{x^2+y^2}{2L_\perp^2}\right], \qquad v \approx c. \tag{16}$$

Surfaces of constant envelope satisfy

$$\frac{(z - vt)^2}{L_{\parallel}^2} + \frac{x^2 + y^2}{L_{\perp}^2} = \text{const.}, \tag{17}$$

which are ellipsoids of revolution when $L_{\parallel} \neq L_{\perp}$. For $L_{\parallel} > L_{\perp}$, the packet is elongated along the propagation direction and provides a simple mathematical realization of the original ETA picture of the photon as a traveling ellipsoidal region of organized charge separation.

A corresponding scalar order-parameter visualization may be written as

$$\Theta(x, t) = \Theta_0 \exp\left[-\frac{(z - vt)^2}{2L_{\parallel}^2} - \frac{x^2 + y^2}{2L_{\perp}^2}\right] \cos(kz - \omega t), \tag{18}$$

so that the deeper separation sector oscillates inside an ellipsoidal envelope while the observable weak-field radiation is carried by the associated P_μ and $F_{\mu\nu}^{\text{eff}}$ fields.

6.2. Interpretive Bridge Back to the Scalar Core

The role of the original scalar order parameter can be retained by viewing P_μ as the effective weak-field completion of a deeper polarization sector tied to Ψ_c. One schematic possibility is

$$P_\mu = g\, \partial_\mu \Theta + Q_\mu, \tag{19}$$

where Θ is an order-parameter degree of freedom associated with charge separation and Q_μ is the non-integrable part that survives in the antisymmetric tensor. Since pure-gradient contributions drop out of (6), the observable radiative field is carried by the nontrivial weak-field geometry, while the deeper scalar sector continues to encode the underlying separation state of the medium.

7. Double-Slit Interference in ETA

The double-slit experiment provides a useful conceptual test for any ontology of the propagating sector. In the ETA reading, interference is not taken to imply that a classical point object literally traverses two paths at once. Instead, the incident excitation is treated as spatially extended during propagation, so that the downstream field configuration depends on both apertures, while the eventual interaction with matter remains localized. The purpose of the present section is not to replace the standard quantum formalism, but to supply a coherent process-based interpretation of its interference structure.

When a coherent incoming mode encounters two apertures, the downstream field is described schematically by the superposed configuration

$$\Psi_{\text{tot}} = \Psi_1 + \Psi_2, \tag{20}$$

where Ψ_1 and Ψ_2 denote the contributions transmitted through the two slits. The corresponding intensity pattern is then

$$I(x) \propto |\Psi_{\rm tot}(x)|^2 = |\Psi_1|^2 + |\Psi_2|^2 + 2\,\mathrm{Re}(\Psi_1^* \Psi_2), \tag{21}$$

so constructive and destructive interference arise from the cross term.

On this reading, the fringe pattern is the observable signature of overlapping charge-separation structure in the underlying medium, while the localized detector click corresponds to a point at which sufficient energy is transferred from the distributed mode to matter. The experiment is therefore interpreted not as evidence that a classical particle literally traverses two paths at once, but as evidence that the propagating physical entity is an extended field organization whose interaction outcomes are discrete.

This viewpoint also clarifies why path measurement destroys interference. Strong coupling at one slit changes the downstream field configuration and suppresses the coherent overlap required for the cross term in (21). In that sense, the apparent "collapse" is treated as a physical reorganization of the propagating mode under interaction rather than as an additional postulate imposed from outside the dynamics.

8. Electron Double-Slit Interference in ETA

The matter sector of ETA is more conjectural than the weak-field radiative sector and should be read accordingly. The working proposal is that localized matter-like states correspond to coupled configurations of the charge-separation and mass-localization fields. In this interpretation, charge is not inserted as a primitive point-particle attribute; rather, it emerges from overlap structure in the underlying fields. This proposal is mathematically interesting, but in its minimal static form it is not yet sufficient to produce a nontrivial finite-energy localized matter solution, as shown below.

The same logic may be extended to matter, especially to the electron. In the ETA framework, the electron is not fundamentally an exact point particle. Rather, it is interpreted as a localized coupled field structure built from the charge-separation and mass-localization sectors.

The effective charge density is written schematically as

$$\rho(x) = q_0 \Psi_c(x) \Psi_m(x), \qquad Q = \int \rho(x)\, d^3x. \tag{22}$$

A stable configuration with $Q = -e$ and total energy $m_e c^2$ is then interpreted as an electron-like state.

If the electron is a structured excitation of the underlying ETA fields, then in propagation it need not be modeled as a perfectly structureless point following one classical trajectory. Instead, the propagating electron state may be treated, at least effectively, as an extended organized field mode whose downstream evolution is shaped by the two-aperture geometry. In that case the transmitted state may again be written schematically as

$$\Psi_{\text{tot}} = \Psi_1 + \Psi_2, \tag{23}$$

with detection probability or intensity governed by

$$P(x) \propto |\Psi_{\text{tot}}|^2. \tag{24}$$

The interference term then arises from coherent overlap of the two transmitted branches rather than from a classical particle literally splitting into pieces.

Within ETA, the difference between photon and electron interference is therefore not a difference between one being truly wave-like and the other truly particle-like. Rather, both are treated as manifestations of organized field dynamics. The photon belongs primarily to the propagating weak-field sector, whereas the electron belongs to the localized matter-like sector. Yet an electron prepared in motion can still exhibit an extended propagation state before interaction, and this is the natural ETA basis for electron double-slit interference.

At the same time, a note of caution is required. In the stronger ETA formulation, the localized matter sector is not yet a completed derivation: the minimal static two-scalar model does not by itself furnish a nontrivial finite-energy localized electron solution, so a viable electron sector likely requires extension by time dependence, conserved charge, gauge stabilization, higher-derivative structure, topology, or some hybrid completion. For that reason, the present electron double-slit discussion should be read as an ETA interpretive extension, not as a finished first-principles derivation.

9. Michelson–Morley and the Absence of an Ordinary Ether Wind

The Michelson–Morley experiment excluded the simplest classical picture of light as a wave in a mechanically stationary ether through which the Earth moves. ETA does not reintroduce such a medium. The underlying charge-separation substrate is not a material fluid with a preferred Galilean rest frame; it is taken instead to be an intrinsic property of space-time itself. The null Michelson–Morley result is therefore not in conflict with ETA. Because the propagating sector is built from local space-time organization rather than motion through an external substance, no simple ether-wind signal is expected.

This point can be summarized by contrasting two pictures. In a classical ether model, one expects the propagation law to depend on the observer's motion relative to a fixed mechanical medium. In ETA, by contrast, one requires the weak-field propagation laws to reduce to the Lorentz-covariant vacuum relations already tested experimentally. The relevant invariant structure is therefore not an external rest frame but the local dynamical capacity of space-time to sustain propagating ODU/charge-separation modes.

10. Alternative Gauge-Theoretic Route from a Complex ODU Field

Besides the P_μ completion used above, one may also suggest a more explicitly gauge-theoretic route to electromagnetism. Introduce a complex field

$$\Phi(x) = R(x)e^{i\theta(x)}, \tag{25}$$

where $R(x)$ represents the magnitude of local charge separation and $\theta(x)$ represents the phase of the ODU cycle. If one requires invariance under local phase transformations

$$\Phi(x) \mapsto e^{iq\alpha(x)/\hbar}\Phi(x), \tag{26}$$

then a gauge connection A_μ is introduced through the covariant derivative

$$D_\mu\Phi = \left(\partial_\mu + \frac{iq}{\hbar}A_\mu\right)\Phi, \tag{27}$$

with field tensor

$$F_{\mu\nu} = \partial_\mu A_\nu - \partial_\nu A_\mu. \tag{28}$$

A corresponding gauge-invariant weak-field Lagrangian is

$$\mathcal{L}_{\Phi A} = -\frac{1}{4}F_{\mu\nu}F^{\mu\nu} + (D_\mu\Phi)^*(D^\mu\Phi) - V(|\Phi|), \qquad V(|\Phi|) = \frac{\lambda}{4}(|\Phi|^2 - a^2)^2. \tag{29}$$

Variation with respect to A_μ yields

$$\partial_\nu F^{\nu\mu} = j^\mu, \qquad j^\mu = \frac{iq}{\hbar}\left[\Phi^* D^\mu\Phi - (D^\mu\Phi)^*\Phi\right]. \tag{30}$$

In polar variables, the current takes the schematic form

$$j^\mu \propto R^2\left(\partial^\mu\theta + \frac{q}{\hbar}A^\mu\right), \tag{31}$$

so electromagnetic current is interpreted as a manifestation of local phase gradients of the underlying ODU field.

The present manuscript does not choose between the P_μ route and the complex-field route as the unique final completion. Both are read as mathematically motivated weak-field realizations of the deeper ETA idea that electromagnetism is not ontologically primary, but emerges from organized charge dynamics of space-time.

11. Localized Sector and Matter Interpretation

The matter sector of ETA is more conjectural than the weak-field radiative sector and should be read accordingly. The working proposal is that localized matter-like states correspond to coupled configurations of the charge-separation and mass-localization fields. In this interpretation, charge is not inserted as a primitive point-particle attribute; rather, it emerges from overlap structure in the underlying fields. This proposal is mathematically interesting, but in its minimal static form it is not yet sufficient to produce a nontrivial finite-energy localized matter solution, as shown below.

In the matter-like sector, one looks for localized stationary or quasi-stationary solutions,

$$\Psi_c(r,t) = \psi_c(r), \qquad \Psi_m(r,t) = \psi_m(r), \tag{32}$$

with total energy determined by (5). The source model defines an effective charge density by (22). A stable configuration with $Q = -e$ and total energy mc^2 is interpreted as an electron-like state.

This move is one of the theory's most distinctive claims: charge is not inserted as a point-particle attribute but emerges from the overlap structure of the two underlying fields. The price of this claim is that the theory must eventually compute the relevant localized branches rather than assume them.

11.1. No-Go Result for Static Localized Solutions in the Minimal Model

The minimal ETA electron hypothesis invites the question whether the static two-scalar theory already supports a nontrivial finite-energy localized branch. For the canonical positive-coupling model written in (1)–(3), one can give a simple scaling argument showing that the answer is negative.

Assume a static finite-energy configuration approaching the vacuum

$$\Psi_c(x) \to a, \qquad \Psi_m(x) \to 0, \qquad |\nabla\Psi_c|, |\nabla\Psi_m| \to 0 \quad \text{as } |x| \to \infty, \tag{33}$$

so that the total energy is

$$E[\Psi_c, \Psi_m] = T + U, \qquad T = \int_{\mathbb{R}^3} \frac{1}{2}\left[(\nabla\Psi_c)^2 + (\nabla\Psi_m)^2\right] d^3x, \qquad U = \int_{\mathbb{R}^3} V(\Psi_c, \Psi_m) d^3x. \tag{34}$$

Now introduce the scaled fields

$$\Psi_c^{(\sigma)}(x) = \Psi_c(\sigma x), \qquad \Psi_m^{(\sigma)}(x) = \Psi_m(\sigma x). \tag{35}$$

In three spatial dimensions the gradient and potential contributions scale as

$$T(\sigma) = \sigma^{-1}T, \qquad U(\sigma) = \sigma^{-3}U, \tag{36}$$

so the total scaled energy is

$$E(\sigma) = \sigma^{-1}T + \sigma^{-3}U. \tag{37}$$

A genuine static localized solution must be stationary under this variation, hence

$$\left.\frac{dE}{d\sigma}\right|_{\sigma=1} = -T - 3U = 0. \tag{38}$$

For the parameter regime

$$\lambda > 0, \qquad \mu^2 > 0, \qquad \beta > 0, \qquad \gamma > 0, \tag{39}$$

the kinetic contribution satisfies $T \geq 0$, while the shifted vacuum potential obeys $U \geq 0$ with equality only in the vacuum sector. Equation (38) can therefore hold only when

$$T = U = 0, \tag{40}$$

which implies the trivial vacuum configuration

$$\Psi_c \equiv a, \qquad \Psi_m \equiv 0. \tag{41}$$

The minimal static canonical ETA model therefore does not support a nontrivial finite-energy localized matter solution in three spatial dimensions.

This negative result should be regarded as constructive rather than destructive. It does not rule out the broader ETA matter program. Instead, it sharpens it by showing that a viable localized sector must go beyond the minimal static positive-coupling two-scalar core. Any future claim that ETA supports electron-like states must therefore specify which stabilizing extension is being invoked and how that extension avoids the present no-go argument.

11.2. Candidate Extensions of the Localized Matter Sector

The no-go result applies only to the minimal static canonical two-scalar model with positive-definite potential in three spatial dimensions. It does not exclude localized matter-like states in extended versions of ETA. Several standard field-theoretic routes remain available in principle.

Explicit time dependence. A localized configuration need not be strictly static. One may instead seek stationary-phase or oscillatory bound states of the schematic form

$$\Psi_c(x,t) = \phi_c(r)e^{-i\omega_c t}, \qquad \Psi_m(x,t) = \phi_m(r)e^{-i\omega_m t}, \tag{42}$$

or more general multi-frequency configurations. In many nonlinear field theories, time dependence modifies the virial balance and can support localized states even when static solutions are forbidden.

Conserved charge and nontopological solitons. One may enlarge the localization sector so that it carries a global $U(1)$ symmetry. Writing the localization field as a complex scalar Φ_m, one may consider

$$\mathcal{L}_m = \partial_\mu \Phi_m^* \partial^\mu \Phi_m - U(|\Phi_m|^2) - \gamma \Psi_c^2 |\Phi_m|^2. \tag{43}$$

If the potential satisfies suitable nonconvexity conditions, time-dependent ansätze of the form

$$\Phi_m(r,t) = f(r) e^{-i\omega t} \tag{44}$$

can support localized Q-ball-like solutions stabilized by a conserved Noether charge.

Gauge stabilization. Another route is to couple the matter sector to a gauge field:

$$\mathcal{L} = -\frac{1}{4} F_{\mu\nu} F^{\mu\nu} + |D_\mu \Phi_m|^2 - U(|\Phi_m|^2) + \frac{1}{2} \partial_\mu \Psi_c \partial^\mu \Psi_c - V_c(\Psi_c) - \gamma \Psi_c^2 |\Phi_m|^2, \tag{45}$$

with

$$D_\mu = \partial_\mu - ieA_\mu. \tag{46}$$

Higher-derivative stabilization. One may add higher-derivative terms that penalize strong compression more severely than canonical quadratic gradients, for example

$$\mathcal{L}_{\text{hd}} = \kappa \left(\partial_\mu \Psi_m \partial^\mu \Psi_m \right)^2, \tag{47}$$

or more structured Skyrme-like gradient contributions.

Topological ingredients. Localized states can also be stabilized by topology rather than by energetic balance alone. This would require a richer field space, for example a multi-component order parameter with nontrivial vacuum manifold,

$$\Phi(x) \in S^2 \text{ or } S^3, \tag{48}$$

so that winding number, knot number, or another topological invariant labels disconnected sectors.

The most realistic completion of ETA may involve more than one of these mechanisms simultaneously.

12. Internal Rotation, Spin, and Effective Dirac Behavior

The source material proposes that localized configurations may carry internal rotational or phase structure of the form

$$\psi(r,\theta,t) = \Phi(r) e^{i(m\theta - \omega t)}. \tag{49}$$

Integer-valued m gives ordinary winding sectors, but spin-$\frac{1}{2}$ requires more than ordinary scalar single-valuedness. The framework therefore suggests that an effective Dirac description should emerge at low energy,

$$(i\gamma^\mu \partial_\mu - m)\psi = 0, \tag{50}$$

not as a postulate at the fundamental level but as an effective equation for collective degrees of freedom of a stabilized localized branch.

A useful intermediate step is to state the relativistic consistency condition that the localized ETA sector must satisfy if it is to reproduce known electron phenomenology. Near a stable localized branch, slow collective excitations are required to admit an effective spinorial description of the form

$$(i\gamma^\mu D_\mu - m_{\text{eff}})\psi = 0, \tag{51}$$

where $D_\mu = \partial_\mu + ieA_\mu/\hbar$ is the electromagnetic covariant derivative and m_{eff} is the rest-energy scale associated with the stabilized localized configuration.

For a proton-centered Coulomb field, the corresponding effective Hamiltonian is

$$H_D = c\,\boldsymbol{\alpha}\cdot\mathbf{p} + \beta m_e c^2 - \frac{e^2}{4\pi\epsilon_0 r}, \tag{52}$$

whose bound-state spectrum is the standard Dirac–Coulomb spectrum. Expanding the exact result in powers of the fine-structure constant α gives the familiar leading relativistic correction

$$E_{n,j} \approx -\frac{13.6\ \text{eV}}{n^2}\left[1 + \frac{\alpha^2}{n^2}\left(\frac{n}{j+\frac{1}{2}} - \frac{3}{4}\right)\right]. \tag{53}$$

Equation (53) is the compact calculational statement that the effective localized ETA sector must reproduce in the relativistic hydrogenic limit.

13. Hydrogen as the First Conservative Benchmark

Hydrogen provides the clearest conservative benchmark for the ETA program. Any framework that seeks to reinterpret matter and radiation in field-ontological terms must at minimum account for discrete bound-state structure, the absence of classical radiative collapse in stationary states, and the leading hydrogenic energy scale. In the present manuscript, the hydrogen sector is treated at the level of an effective standing-field reduction. The point is not to claim a first-principles derivation of all atomic structure from the full nonlinear theory, but to show that the ETA framework can reproduce the gross hydrogen spectrum in a mathematically familiar limit while assigning it a different physical interpretation.

ETA adopts the usual effective one-body equation

$$-\frac{\hbar^2}{2m_e}\nabla^2\psi - \frac{e^2}{4\pi\epsilon_0 r}\psi = E\psi, \tag{54}$$

but reinterprets ψ as the profile of a real standing field rather than a purely probabilistic amplitude.

In ETA, the hydrogen electron is modeled not as a point particle in orbit, but as a proton-centered standing bound field with spatial extent. Quantization is then attributed to phase closure rather than an independent quantum rule:

$$\psi(\phi + 2\pi) = \psi(\phi) \quad \Longrightarrow \quad m_e v r = n\hbar, \qquad n = 1, 2, 3, \ldots \tag{55}$$

Combining (55) with the Coulomb balance relation

$$\frac{m_e v^2}{r} = \frac{e^2}{4\pi\epsilon_0 r^2} \tag{56}$$

yields

$$r_n = a_0 n^2, \qquad a_0 = \frac{4\pi\epsilon_0\hbar^2}{m_e e^2}, \tag{57}$$

and hence

$$E_n = -\frac{m_e e^4}{2(4\pi\epsilon_0)^2\hbar^2}\frac{1}{n^2} = -\frac{13.6 \text{ eV}}{n^2}. \tag{58}$$

The internal ETA interpretation is that atomic stability arises because inward Coulomb attraction is balanced by the energetic cost of over-localizing the standing field. At the schematic level,

$$E(r) \sim \frac{A}{r^2} - \frac{B}{r}, \tag{59}$$

so that shrinking the configuration too far raises the gradient or localization energy faster than the attractive term can lower it.

Stationary states are taken to be non-radiating because

$$\psi(r,t) = \Phi(r)e^{-i\omega t} \quad \Longrightarrow \quad |\psi(r,t)|^2 = |\Phi(r)|^2, \tag{60}$$

which leaves the observable density time independent. Radiative transitions are then reinterpreted as reorganizations between standing states accompanied by emission of a propagating excitation of the separation field, with energy difference

$$\Delta E = h\nu. \tag{61}$$

14. Perturbative Atomic Structure

The source material next interprets standard atomic corrections inside the same standing-field picture.

14.1. Stark Effect

For a uniform external electric field $\mathbf{E} = E_0\hat{z}$, one uses the usual perturbation Hamiltonian

$$H_S = eE_0 z. \tag{62}$$

Within ETA this is interpreted as a polarization-induced deformation of the standing field rather than a distortion of a classical particle orbit. At first order, the hydrogenic ground-state shift vanishes by parity,

$$\Delta E_{1s}^{(1)} = \langle 1s|eE_0 z|1s\rangle = 0. \tag{63}$$

The leading ground-state Stark response is therefore second order,

$$\Delta E_{1s}^{(2)} = \sum_{n\neq 1} \frac{|\langle n|eE_0 z|1s\rangle|^2}{E_1 - E_n} = -\frac{1}{2}\alpha_H E_0^2, \tag{64}$$

where α_H is the static polarizability of hydrogen.

14.2. Zeeman Effect

For a uniform magnetic field $\mathbf{B} = B\hat{z}$, the orbital Zeeman contribution is

$$H_Z = \frac{e}{2m_e}\mathbf{B}\cdot\mathbf{L} = \mu_B B \frac{L_z}{\hbar}, \qquad \mu_B = \frac{e\hbar}{2m_e}. \tag{65}$$

For a hydrogenic state $|n\ell m\rangle$ this gives the first-order shift

$$\Delta E_{n\ell m}^{(1)} = \mu_B B\, m. \tag{66}$$

Within ETA this is read as coupling between external magnetic structure and the angular phase organization of the bound standing field.

14.3. Relativistic Correction and Spin-Orbit Coupling

The relativistic kinetic expansion

$$E = \sqrt{p^2c^2 + m^2c^4} = mc^2 + \frac{p^2}{2m} - \frac{p^4}{8m^3c^2} + \cdots \tag{67}$$

leads to the familiar correction

$$H_{\text{rel}} = -\frac{p^4}{8m_e^3c^2}. \tag{68}$$

Similarly, the standard spin-orbit term is

$$H_{\text{SO}} = \frac{1}{2m_e^2c^2}\frac{1}{r}\frac{dV}{dr}\,\mathbf{L}\cdot\mathbf{S}. \tag{69}$$

The ETA interpretation is geometric: orbital winding and internal rotational structure are treated as two aspects of the same organized field state.

14.4. Lamb-Shift-Type Correction

The source material proposes a short-distance modification of the effective central potential,

$$V_{\text{eff}}(r) = -\frac{e^2}{4\pi\epsilon_0 r} + \delta V(r), \qquad \Delta E = \int |\psi(r)|^2 \delta V(r)\, d^3r, \tag{70}$$

with a schematic choice such as

$$\delta V(r) = V_0 e^{-r/r_\eta}, \qquad r_\eta \ll a_0. \tag{71}$$

This captures the desired qualitative feature that S-states are affected much more strongly than P-states because of their larger central amplitude. However, the observed Lamb shift is not derived from first principles here; only a qualitative mechanism is proposed.

15. Nonlinear Hydrogen Extension and Compressed Branches

A more speculative extension of ETA introduces a self-binding cubic nonlinearity in the hydrogenic effective equation,

$$-\frac{\hbar^2}{2m_e}\nabla^2\psi - \frac{e^2}{4\pi\epsilon_0 r}\psi - g|\psi|^2\psi = E\psi, \qquad g > 0. \tag{72}$$

Using the trial state

$$\psi(r) = \frac{1}{\sqrt{\pi a^3}} e^{-r/a}, \tag{73}$$

one obtains the variational energy

$$E(a) = \frac{\hbar^2}{2m_e a^2} - \frac{e^2}{4\pi\epsilon_0 a} - \frac{g}{16\pi a^3}. \tag{74}$$

The extra a^{-3} term can produce additional compressed branches. But the same term also tends to shift the ordinary ground state unless a selective mechanism suppresses it in the standard branch. Thus compressed hydrogenic states are, at present, mathematical possibilities rather than established physical predictions.

Earlier ETA notes also briefly explored a speculative fractional phase-closure extension $n = 1/p$ with $p = 2, 3, \ldots$, which formally yields sub-ground scaling

$$E_{1/p} = -13.6\, p^2 \text{ eV}, \qquad r_{1/p} = \frac{a_0}{p^2}. \tag{75}$$

Because such modes would require nontrivial topology or multivalued phase structure beyond ordinary single-valued closure, and because no mechanism has yet been established that preserves the observed ordinary hydrogen spectrum, they are not included in the minimal model and are not claimed here as established physical predictions.

16. Programmatic Extension: Matter as Condensed Space-Time and Gravity as the Response to Condensation

The discussion in this section is explicitly programmatic. The current ETA framework does not yet contain a complete gravitational field theory, nor does it derive the Einstein or Newtonian limits from first principles. What follows is therefore not presented as an established result of the theory, but as a natural ontological and mathematical extension suggested by the structure of the mass-localization sector.

A possible next step in ETA is to interpret matter not as something placed in space-time, but as a condensed phase of space-time itself. On that reading, gravitation would correspond to the large-scale response of the substrate to the presence, degree, and distribution of such condensation. The schematic constructions introduced below are intended only as organizing hypotheses and weak-field targets for a future completion.

In the existing formulation, the charge-separation field $\Psi_c(x^\mu)$ measures the local degree of polarization of the substrate, while the mass-localization field $\Psi_m(x^\mu)$ measures the degree to which energy becomes confined into persistent matter-like structure. This already suggests a deeper ontological reading: what is ordinarily called matter may be understood as a highly organized or condensed state of the underlying space-time medium, rather than as an independently fundamental ingredient.

On this interpretation, empty or weakly excited space-time corresponds to an uncondensed background state, propagating radiation corresponds to traveling organized excitations of that state, and matter corresponds to a stable condensed configuration sustained by the localization sector. The distinction between radiation and matter is then not a distinction of substance, but a distinction of phase or solution class. This is closely aligned with the broader ETA claim that propagation and localization are different dynamical regimes of a common field-theoretic substrate.

Such a viewpoint invites a corresponding reinterpretation of gravitation. If matter is condensed space-time, then gravity may be understood as the large-scale dynamical response of space-time to the presence, degree, and distribution of that condensation. Rather than being introduced as an externally added force between independently existing masses, gravitation would emerge from how condensed regions modify the organization of the surrounding substrate. In that sense, gravitational attraction would reflect the relational tendency of the space-time medium to respond coherently to localized condensation.

Within ETA language, the natural field associated with this idea is the mass-localization sector. One may suppose that, in a suitable weak and slowly varying regime, an effective gravitational potential emerges from the localization sector according to

$$\Phi_g \propto f(\Psi_m, \partial\Psi_m, \ldots), \tag{76}$$

for some effective functional f of the localization field and its derivatives. In the simplest Newtonian limit, one would require this emergent potential to satisfy a Poisson-type equation of the form

$$\nabla^2 \Phi_g \propto \rho_m, \tag{77}$$

where ρ_m denotes the effective mass-energy density associated with the localization sector.

A simple illustrative effective model is

$$\Phi_g = \kappa_1 \Psi_m + \kappa_2 \nabla^2 \Psi_m + \kappa_3 \Psi_m^2 + \cdots, \tag{78}$$

with constants κ_i fixed by the eventual weak-field matching conditions. If the leading contribution is approximately linear in the slowly varying regime,

$$\Phi_g \approx \kappa_1 \Psi_m, \tag{79}$$

then the gravitational Poisson law becomes

$$\nabla^2 \Psi_m \propto \rho_m. \tag{80}$$

In this reading, the localization field itself plays the role of the deeper variable whose organization sources the effective gravitational potential.

This gives rise to a three-level picture of the ETA substrate:

1. uncondensed space-time, representing the background dynamical medium;
2. propagating excitations of space-time, corresponding to radiation-like modes;
3. condensed space-time, corresponding to stable matter-like configurations.

In such a scheme, gravity is the large-scale ordering effect produced by gradients or concentrations of the condensed phase. Matter does not curve an otherwise passive arena from the outside; rather, matter is one regime of the arena, and gravity expresses how that regime organizes neighboring structure.

16.1. Speculative Weak-Field Gravitational Optics and Timing

If ETA is extended so that gravity is understood as an ODU property of the mass-localization sector of space-time, then two natural weak-field questions arise immediately: how light should propagate through such a background, and how local clock rates should respond to it.

In the electromagnetic sector, the photon is modeled as a propagating weak-field excitation of the deeper charge-separation medium. If a massive body generates a slowly varying background in the localization sector, then the effective propagation law of the photon should no longer be the flat-space equation (13), but a weakly distorted form in which the medium properties depend on position. Schematically, one may write

$$\partial_\mu \partial^\mu P_\nu = 0 \quad \longrightarrow \quad \partial_\mu (K^{\mu\alpha}(x) \partial_\alpha P_\nu) = 0, \tag{81}$$

where the tensor-like quantity $K^{\mu\alpha}(x)$ encodes the influence of the background mass-localization state on the weak-field photon sector. In a lowest-order isotropic model one might write

$$K^{\mu\alpha}(x) = \eta^{\mu\alpha} + \chi\, \Xi^{\mu\alpha}(\Psi_m, \partial\Psi_m, \ldots), \tag{82}$$

with χ a small coupling parameter and $\Xi^{\mu\alpha}$ the localization-induced correction. In this interpretation, bending of light near a massive body is not described as the action of an external force on a point particle, but as propagation of a charge-separation wave through a space-time medium whose local organizing structure has been altered by mass localization.

A parallel argument applies to relativistic timing effects. If the local state of the mass-localization sector changes the organization of physical processes, then clock rates should depend on that background. One may therefore introduce a schematic effective proper-time relation of the form

$$d\tau_{\text{eff}} = dt\, F(\Psi_m, \partial\Psi_m, \ldots), \tag{83}$$

with $F \to 1$ in the asymptotically undisturbed region. For weak fields one may expand

$$F(\Psi_m, \partial\Psi_m, \ldots) = 1 + \alpha_1 \Psi_m + \alpha_2 (\partial\Psi_m)^2 + \cdots, \tag{84}$$

so that the leading timing correction is directly tied to the local degree of mass localization. In a weak gravitational field generated by the Earth, such a relation would be expected to reproduce the small timing shifts required in practical navigation systems. On this view, satellite timing corrections are interpreted as manifestations of how the mass-localization ODU state of space-time changes the rate of local physical evolution.

At present this should be read strictly as a forward-looking application of the proposed gravity extension rather than as an established prediction of the theory.

17. Relationship to Established Theory

ETA should not be read as a rejection of standard electromagnetism, quantum mechanics, or relativistic wave theory in the domains where those frameworks are empirically successful. Rather, ETA proposes that some of their familiar structures may be understood as effective limits or emergent descriptions of a deeper field system.

Accordingly, when the present manuscript reproduces Maxwell-form equations, hydrogenic spectra, or relativistic effective structures, these reproductions should be interpreted carefully. In some cases they represent genuine internal reductions of the ETA framework; in other cases they represent effective consistency targets that the full theory must eventually reproduce. Keeping that distinction explicit is essential if the framework is to be assessed scientifically rather than rhetorically.

18. What Is Derived, What Is Reproduced Effectively, and What Remains Conjectural

For clarity, the main claims of the present manuscript may be separated into three levels.

18.1. Derived or Established Within the Present Formulation

- The two-field ETA Lagrangian and its Euler–Lagrange equations.
- A consistent weak-field covariant completion yielding Maxwell-form field equations.
- A no-go result for nontrivial finite-energy localized matter solutions in the minimal static positive-coupling two-scalar model.

18.2. Reproduced at the Level of Effective Reduction or Consistency Target

- The hydrogenic gross spectrum through an effective standing-field reduction.
- The interpretation of stationary bound states as non-radiating standing-field configurations.
- The requirement that any viable localized ETA matter sector reproduce effective Dirac behavior at low energy.

18.3. Conjectural or Programmatic Extensions

- The existence of stabilized electron-like localized branches in an extended matter sector.
- First-principles derivation of spinorial structure from the underlying fields.
- Precision atomic corrections derived directly from ETA rather than imported effectively.
- Matter as condensed space-time and gravity as the response to condensation.
- Weak-field gravitational optics and timing relations in a completed localization-sector extension.

This separation is important. The value of the present manuscript lies not in claiming more than has been achieved, but in making explicit which parts of the framework are already formulated, which parts are effectively reproduced, and which parts remain to be developed.

19. Scientific Status, Open Problems, and Standards of Evidence

ETA is best understood at present as a structured field-theory research program rather than a completed alternative to standard quantum electrodynamics or gravitation. Its strongest current achievements are the explicit two-field formulation, the effective weak-field Maxwell sector, the hydrogenic standing-field reduction, and the no-go result for the minimal static matter sector. These give the framework real mathematical content.

At the same time, the theory has not yet crossed the threshold required of a completed microscopic alternative. Stable localized matter branches have not yet been constructed in a fully satisfactory sector; spinorial behavior is not yet derived from the underlying fields; precision spectroscopy is not yet obtained from first principles; and the gravitational extension remains schematic. These are not minor gaps but central derivational tasks. They should therefore be treated as the primary standards of success for the future development of the program.

The principal open tasks are equally clear:

1. numerical or analytic construction of finite-energy localized matter solutions in an extended ETA matter sector;
2. derivation of the effective current J^{μ}_{eff} from the full nonlinear theory;
3. derivation of effective spinorial behavior rather than assertion of it;
4. quantitative spectroscopy from the underlying theory itself;
5. identification of a falsifiable finite-structure prediction, such as a nontrivial high-momentum form factor;
6. and development of a genuine gravitational completion reproducing weak-field tests.

A convenient representation of the finite-structure expectation is

$$M(q^2) = M_{\text{point}}(q^2)F_e(q^2), \qquad F_e(0) = 1, \qquad F_e(q^2) = 1 - \frac{\langle r^2\rangle_e}{6}q^2 + O(q^4). \tag{85}$$

20. Conclusion

ETA theory proposes a unified field-theoretic program in which photons, localized matter, hydrogenic bound structure, and a prospective gravitational sector are interpreted as different organized regimes of a deeper space-time substrate. In its present form, the framework provides a definite two-field nonlinear model, a consistent weak-field Maxwell-like sector, a process-based interpretation of the photon, an effective standing-field reading of hydrogenic structure, and a clear no-go result showing that the minimal static matter sector is insufficient to support nontrivial finite-energy localized particle-like states.

The manuscript therefore supports two conclusions. First, ETA is mathematically substantive enough to be discussed as more than a purely verbal interpretation. Second, it is not yet a complete replacement for established theory. Its significance at present lies in the clarity with which it states both its internal architecture and its missing derivations. If future work succeeds in constructing stabilized matter branches, deriving effective spinorial structure, reproducing precision atomic phenomena from the underlying equations, and developing a genuine gravitational completion, ETA could evolve from a programmatic framework into a quantitatively testable unified field theory.

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