**Unification of the Four Forces and Superluminal Communication via the Field Combination Principle: A Reconstruction of Generalized Unified Field Equations Based on ABC Theory**

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**Abstract:**  
This paper aims to achieve a deep integration within theoretical physics by combining the ABC Cosmic Vortex Field Theory, proposed by Li Zhijun, with a generalized field equation system designed to unify gravity, electromagnetism, the strong force, and the weak force, while also incorporating a framework for superluminal communication. Our core thesis is that this equation system is not an isolated mathematical construct but represents the complete expression of the dynamical laws governing the combination states of ABC fields (A-field: electromagnetic vortex; B-field: color charge vortex; C-field: Higgs vortex) across the full physical landscape, from the Planck scale to cosmological scales. The foundational work of this paper includes:

1. Interpretation and Mapping of Equation Terms: A thorough ABC field-theoretic interpretation of key terms within the unified field equations (such as the covariant derivative , various field strength tensors , , , topological terms like , and the superluminal operator ), mapping them to interactions or topological properties of specific ABC field combination states.
2. Field-Theoretic Mechanism for Superluminal Communication: We propose that superluminal communication does not directly violate relativity but utilizes an instantaneous correlation mode based on topological entanglement, excited by ABC field combination states within special backgrounds (e.g., negative mass dark matter). The mathematical framework is interpreted as a resonance excitation operator for the A-field and C-field in a specific topologically non-trivial spacetime.
3. Field Combination Picture of Four-Force Unification: We argue that the four fundamental forces are different manifestations of the same set of ABC field combination states at different energy scales and dimensional projections. The unified field equations describe the constraint conditions that maintain the self-consistency of this multi-dimensional projection.
4. Derivation of Mathematical Self-Consistency: Starting from the generalized action principle of ABC field theory and by introducing holographic boundary conditions and topological current conservation laws, we attempt to derive this unified field equation system, arguing that it may be a necessary consequence of ABC field dynamics when cosmological boundary effects are considered.

This work aims to provide a novel theoretical framework for the unification of the four forces and superluminal communication based on the field combination principle, offering a potential direction for future research.

**Keywords:** ABC Field Theory; Unification of Four Forces; Superluminal Communication; Unified Field Equations; Topological Entanglement; Holographic Principle

1. **Introduction: The Quest for a Unified Theory**

Einstein’s later years were dedicated to the pursuit of a unified field theory, which remained unfinished. Subsequently, the Standard Model achieved remarkable success in unifying electromagnetism, the weak force, and the strong force. However, the incorporation of gravity and the realization of grand concepts like superluminal communication remain ultimate challenges for modern physics. The mathematical framework referenced in this study attempts to describe the unification of the four fundamental forces and its application to superluminal communication using a single set of equations.

Professor Li Zhijun’s ABC Field Combination Theory ontologically reduces all physical entities to combination states of three fundamental fields: A, B, and C. This paper attempts a theoretical fusion: interpreting this grand mathematical framework within the context of the ABC Field Combination Theory.

Our core thesis is that this unified field equation system can be understood as describing the dynamical behavior of ABC field combination states on cosmological scales. The superluminal communication operator might describe how specific ABC combination states utilize the deep topological structure of the universe to achieve non-local correlations. The following sections will attempt to interpret these equations and explore their possible theoretical origins.

1. **Interpretation of the Unified Field Equations through ABC Field Combination Theory**

We will attempt a line-by-line, term-by-term physical interpretation of the equation system, linking it to concepts from the ABC Field Combination Theory.

**2.1 Equation One: Coupled Dynamics of Matter Fields and Gauge Fields**

The first equation has the general form:

* Interpretation of the Left-Hand Side :
  + can be interpreted as the gravitational field. In ABC theory, it might correspond to an excitation of a specific ABC field combination state (e.g., ) with spin-2.
  + is the Lagrangian density for all fermion fields, representing matter fields. In ABC theory, each fermion can be viewed as a specific ABC field combination state.
  + The operator acting on this matter term might indicate a higher-order coupling derivative relationship between the gravitational field and all matter fields. This could suggest that gravity originates from the collective excitation effects of matter field combination states.
* Interpretation of the Right-Hand Side Terms:
  + : Represents the free Dirac operator, possibly describing the free propagation of A-field excitations.
  + : This is a key term. is the C-field (Higgs field). might be related to the topological invariant (e.g., Euler characteristic or winding number) of the n-th cosmic topological structure. is the Möbius function, possibly used to filter for stable topological structures. is the corresponding equivalent gauge field strength. The entire term might describe how topological fluctuations of the C-field background effectively generate various gauge fields (electromagnetic, weak, strong interactions).
  + : This is a topological current term. , in its contour integral form, might correspond to the boundary of cosmic-scale topological defects (e.g., wormholes) in real spacetime. This term could describe how matter and energy influence the gravitational field at the cosmic topological defects.
* Comprehensive ABC Interpretation: This equation might describe how matter fields (ABC fermion combination states), through topological fluctuations of the C-field background, excite equivalent gauge forces, and how their interaction with cosmic topological defects collectively serves as a source term influencing the dynamics of the gravitational field (ABC graviton combination state).

**2.2 Equation Two: Constraint Conditions for Four-Force Unification**

The second equation is a generalized and coupled form of the Einstein field equations, Yang-Mills equations, etc.

and includes terms like related to curvature .

* ABC Interpretation: This equation places gravity (), electromagnetism (), and possibly the weak force () on one side, with the matter source and currents of these fields on the other. This may indicate that these forces are not independent but different components of a unified “cosmic tension field” (i.e., the overall curvature manifestation of the ABC field background). The equation itself is the self-consistency condition that this unified field must satisfy.
* ABC Interpretation: The left-hand side contains the topological phase factor , and the right-hand side contains the spacetime curvature scalar . This equation might reveal the intrinsic connection between gauge symmetry and gravity (spacetime geometry), i.e., the mutual constraint between gauge field strength and spacetime curvature. In ABC theory, this implies that the dynamics of the A and B fields are unified with the geometry of the C-field background.

**2.3 Field Combination Mechanism for the Superluminal Communication Framework**

The framework involves the operator and associated terms like and .

* : The superluminal communication Hamiltonian operator. The state it acts upon might not be a general matter state but a special ABC entangled state—for example, a topological soliton state formed by highly entangled A and C fields, resonating with the topological structure of the B-field background, serving as an information carrier.
* : This might describe the propagation of the information carrier through the topological structures of the universe. might select stable topological channels that permit a certain form of correlation.
* : This could be a topological current conservation term, ensuring information integrity during transmission.
* Envisioned Physical Picture: Superluminal communication might not be “propagation” in the traditional sense but rather “switching.” By preparing a specific entangled ABC field combination state () and causing it to resonate with a pre-existing topological structure of the background spacetime that connects two locations, this information state might instantaneously “switch” from one end of the topological structure to the other, thereby achieving non-local correlation. The apparent superluminal特性 (characteristic) could arise because it does not propagate entirely within four-dimensional spacetime but utilizes a higher-dimensional topological structure.

1. **Conception of a Theoretical Derivation: Starting from the ABC Field Action**

We can conceive a theoretical path to derive the entire equation system starting from the most general action of ABC field theory.

Define the total action:

where:  
1. : The kinetic action of the ABC fields themselves.  
2. : The action describing the overall topological structure of the universe. This term might be the topological root of superluminal communication and four-force unification.  
3. : A boundary action based on the holographic principle.

By applying the variational principle with respect to the metric , various gauge fields, and the moduli parameters of the topological structure, it might be possible to derive field equations similar in form to those in the referenced system. For example:  
\* Variation with respect to the metric might yield generalized Einstein field equations.

* Variation with respect to gauge fields might yield generalized Yang-Mills equations.
* Variation with respect to topological moduli parameters might yield the self-consistency conditions for the topological structure, which could implicitly contain the form of the first equation and the superluminal communication equation .

This would require subsequent, extremely complex mathematical work for verification and refinement.

1. **Conclusion and Outlook**

This paper has attempted a conceptual fusion of the ABC Field Combination Theory with a grand unified field equation system. We have proposed a theoretical conjecture:  
1. The unification of the four forces may originate from the unified dynamics of ABC fields within acosmic background possessing complex topological structure.  
2. The mathematical framework for superluminal communication, , might describe the physical process by which specific ABC field combination states utilize pre-existing topological channels in the universe to achieve correlation.

This work represents a preliminary construction of a theoretical framework. Future efforts may need to focus on:  
\* Rigorously defining the mathematical properties and solution conditions of this equation system.

* Identifying potential experimental predictions that could test the theory.
* Deepening the exploration of potential connections and distinctions between this theory and existing mainstream theories (e.g., quantum gravity, string theory).

This paper aims to provide a possible interpretive framework for a grand theoretical conception, offering inspiration for future exploration.