A Coupled-Field Ontology for Entanglement, Spin, and Fermionic Structure

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We propose a real, local, deterministic coupled-field (CF) framework that provides an ontological underpinning for key quantum phenomena traditionally treated as axiomatic. Within this approach, quantum entanglement is not a primitive nonlocal feature but emerges from a shared internal phase structure established at pair creation and accessed locally at measurement. We show that this mechanism reproduces the exact singlet-state correlation while remaining fully consistent with Bell's theorem, whose constraints apply to preassigned discrete values rather than continuous internal degrees of freedom with deterministic response functions.

Crucially, entanglement appears here as the first experimentally constrained manifestation of a deeper coupled-field ontology. The same internal field structure naturally gives rise to spin-1/2 behavior, conserved charge as a Noether current, and a characteristic action scale identified with Planck's constant. In this sense, standard quantum mechanics is recovered as an effective formalism describing ensembles of coupled-field configurations, rather than as a fundamental ontology.

Although quantum mechanics preceded such a field-based description historically, the logical dependence appears to be reversed: the coupled-field framework explains why the quantum formalism works and clarifies the physical origin of phenomena that quantum mechanics postulates. This work suggests that fermions may be understood as structured dynamical entities composed of interacting real fields, offering a unified ontological account of entanglement, spin, and charge.