An Absolute Phase Space for the Physicality of Matter

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0.1 Abstract (extended)

Our aim is to devise a new foundational basis, framework, and model for physical reality that solves current contentious problems in many areas of physics, to allow new discoveries and further predictions. By executing our model at a slightly lower level than a fermion's assumed physical existence, and with more reality-relevant intrinsic information than has been previously assumed, we can understand how QM happens, understand vacuum energy, develop (pre-)deterministic structures, give reasons for the Standard Model abstractions, and speculate on how some current assumptions might be better explained.

We define an abstract and absolute phase space for sub-quantum intrinsic wave states, from three axes, each mapping directly to a duality having fundamental ontological basis: a *conserved/nonconserved* axis, a *real/imaginary* axis, and a *dimensional/nondimensional* axis. Many fundamental principles and phenomena of quantum physics *emerge* from the interaction algebra and a model deduced from principles of 'unique solvability' and 'identifiable entity', using few assumptions or imposed processes.

The physical model defines two-part bosons as continuous virtual waves in the phase space. Fermions are defined as having (a minimum of) four parts, from (a minimum of) two bosons, as self-quantizing snapshots of those waves when simple conditions are met. To illustrate the scheme, we provide examples of slit experiments and of QCD, and suggest approaches for other applications in many disciplines in physics.

0.2 Basic Conclusions

0.2.1 ***Unification***: We can show how all matter may exist as sequences of continuous waves and particle events. The fermion (3.1) is a snapshot of the component bosonic waves at a point, when specific simple conditions are met: two bosons each having a wave element in *conserved* phase. This unifies the traditional categories of 'wave' and 'particle', and provides satisfactory answers to wave-particle duality, double-slit experiments, and other unintuitive or nondeterministic quantum effects. The fermion event description also includes a unified field that encapsulates known forces, both as intrinsic quantum potentials and their integrable macroscopic expressions.

0.2.2 ***Correspondence Principle***: Our model derives both quantum and classical mechanics using the same picture and hierarchy (Table 4, 3.9), along with reasons for classical limits.

0.2.3 ***New fundamentals***: Quarks and leptons are no longer fundamental, existing only instantaneously before being radiated away as bosons again (3.3). We have a minimal description of real and virtual parameters at a fermion event, and the compactified form is a referencing projection to source terms like charge and mass.

0.2.4 ***Exclusion and Latency***: The boson structure and its phase mechanism provide the means for two distant fermion states to become part of the same continuous wave, with many physical consequences (4.5): conservation of source information during propagation, the latency of all *nonconserved* terms, fundamental angular momentum, causality (sequence), wave propagation, and the origins of *nonconserved* fields and integrable macroscopic domains and potentials.

0.2.5 ***Confinement***: With phase operators and self-quantizing matter in a predeterministic model, some infinities and discontinuities are avoided. Fundamental fields have no fall off and unitary source value, their inverse-power relations being effects of propagation in a matter network.

0.2.6 ***Relativity and Inertial Mass***: A change of velocity of a composite particle requires a distortion of the 'macroscopic positional structure' of the sequence of fermion events (3.9). We believe that this would demonstrate length contraction, and the model as a whole can demonstrate both Special Relativity and General Relativity at the abstraction level where macroscopic physics is emergent.