Abstract Submitted
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Field Theory of Fundamental Interactions[1] SHOUHONG WANG, Indiana University, TIAN MA, Sichuan U — First, we present two basic principles, the principle of interaction dynamics (PID) and the principle of representation invariance (PRI). Intuitively, PID takes the variation of the action under energy-momentum conservation constraint. We show that the PID is the requirement of the presence of dark matter and dark energy, the Higgs field and the quark confinement. PRI requires that the SU(N) gauge theory be independent of representations of SU(N). It is clear that PRI is the logic requirement of any gauge theory. With PRI, we demonstrate that the coupling constants for the strong and the weak interactions are the main sources of these two interactions, reminiscent of the electric charge. Second, we emphasize that symmetry principles–the principle of general relativity and the principle of Lorentz invariance and gauge invariance–together with the simplicity of laws of nature, dictate the actions for the four fundamental interactions. Finally, we show that the PID and the PRI, together with the symmetry principles give rise to a unified field model for the fundamental interactions, which is consistent with current experimental observations and offers some new physical predictions.

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