

Abstract Submitted
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Unified Field Theory and Force Formulas of Interactions¹ TIAN MA, Sichuan University, SHOUHONG WANG, Indiana University — The main objective of this talk is to drive a unified field model coupling four interactions, based on the principle of interaction dynamics (PID) and the principle of representation invariance (PRI). Intuitively, PID takes the variation of the action functional under energy-momentum conservation constraint. PRI requires that physical laws be independent of representations of the gauge groups. One important outcome of this unified field model is a natural duality between the interacting fields (g, A, W^a, S^k) , corresponding to graviton, photon, intermediate vector bosons W^\pm and Z and gluons, and the adjoint bosonic fields $(\Phi_\mu, \phi^0, \phi_w^a, \phi_s^k)$. This duality predicts two Higgs particles of similar mass with one due to weak interaction and the other due to strong interaction. PID and PRI can be applied directly to individual interactions, leading to 1) modified Einstein equations, giving rise to a unified theory for dark matter and dark energy, 2) three levels of strong interaction potentials for quark, nucleon/hadron, and atom respectively, and 3) a weak interaction potential. These potential/force formulas offer a clear mechanism for both quark confinement and asymptotic freedom.

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