

that no renormalizable field theory without non-Abelian gauge fields can be asymptotically free.

Asymptotically free field theories are clearly of great theoretical interest. They provide one with models in which the asymptotic behavior of amplitudes is calculable by ordinary perturbation theory. In addition there appears to be evidence, experimental and theoretical, that such theories are required to explain deep inelastic scattering. The phenomena of scaling predicted by Bjorken⁽¹²⁾ is, up to logarithmic corrections, a true asymptotic feature of asymptotically free theories. Furthermore, it now appears that Bjorken scaling can only occur if the strong interactions are asymptotically free.⁽²⁶⁾ The fact that the only theories that can be asymptotically free are those involving non-abelian gauge fields and that, as we shall see in the following, asymptotically free gauge theories can be constructed is a strong argument for a gauge theory of the strong interactions.