

provide a compelling case for a non-abelian gauge theory of the strong interactions. Indeed if one accepts the renormalization group approach and the experimental reality of Bjorken scaling as an asymptotic phenomena then there is, probably, no other choice.<sup>(29)</sup> This possibility is explored in the following.

In Section II we shall outline the derivation of the renormalization group equations for pure Yang-Mills theories (which involve only gauge fields). These equations are discussed in greater detail in Appendix I. We also discuss the notion of the effective coupling constant and exhibit the solution of the renormalization group equations.

In Section III we calculate the renormalization group parameters for pure Yang-Mills theories.

In Section IV we incorporate fermions into the gauge theories, without destroying their asymptotic freedom. The large momentum behavior of the effective coupling constant and Green's functions is derived.

In Section V the construction of realistic physical models of the strong interactions is discussed. We analyze the structure functions of deep inelastic scattering and the total electron-positron annihilation cross-section in these models. These applications will be explored further in a forth-coming publication.<sup>(30)</sup> The major problem remaining in these gauge theories is how to break the gauge symmetry and provide masses for the vector mesons. Various dynamical possibilities are discussed in Section V.