

operator-product expansion, and thus the related behavior of electroproduction structure functions in the Bjorken region. (20,21,22,23)

In particular it was realized that Bjorken scaling could be understood within the framework of the renormalization group if there was an ultraviolet (UV) stable fixed point of the renormalization group. At the fixed point, however, the anomalous dimensions of the relevant operators in Wilson's expansion would all have to vanish. All the indications are that this can only occur if the value of the fixed point of the renormalization group is zero. (24,25) This has recently been proved in a large class of field theories. (26) In such a theory the effective coupling constant vanishes for large space-like momenta and we describe this phenomena by saying that the theory is asymptotically free. An asymptotically free theory will exhibit Bjorken scaling (up to, perhaps, logarithmic corrections) and in addition will lead to all the naive lightcone or parton model results. (26)

The possibility that a given field theory is asymptotically free is easily explored by simple perturbation theory calculations. Quantum electrodynamics was known, from the original work of Gell-Mann and Low, not to be asymptotically free. A. Zee extended this result to scalar-fermion theories involving one coupling constant. (27) Recently S. Coleman and one of us (D.J.G.) have proved that no theory which does not involve non-abelian gauge mesons can be asymptotically free. (28) Together with the recent discovery that non-abelian gauge theories are asymptotically free (1,2,3) these developments