1. INTRODUCTION

The widespread belief among particle physicists that QCD is the correct theory of the strong interactions is supported by a wide range of tests. Because of calculational difficulties, these tests are qualitative rather than quantitative, but they are impressive for their variety\(^1\). For both experimental and theoretical reasons, most of them concern processes that involve leptons in either the initial or the final state, but my brief at this School is to discuss purely hadronic reactions.

Calculations of scattering processes rely on perturbation theory. The coupling \(\alpha_s\) of QCD becomes small at short distance, which is necessary in order that a perturbation expansion may have a chance of being valid. In the vast majority of hadron-hadron collisions, there is no short-distance interaction and so there is no reason to believe that a perturbation-theory calculation is applicable. The problem, then, is to pick out the small fraction of events in which short-distance effects are dominant. We have no precise way of doing this, but the folklore is that we recognise such events by looking for an unusually
large momentum transfer $t$. It is certainly plausible that large $t$

is generated only in those rare events where the two initial

hadrons collide head-on, rather than peripherally as in the more
typical collisions.

There are two kinds of large-$t$ event, exclusive reactions such

as wide-angle elastic scattering, and inclusive reactions in which

one or more particles carry off large transverse momentum. I

shall discuss both of these in my two lectures.

Even if we can correctly identify the collisions in which the

short-distance force dominates, there are severe calculational
difficulties, which are encountered in all applications of QCD$^1$.

At least at present, and probably for the foreseeable future,

precise calculations are possible only up to the leading power of

the large variable $t$. It is far from sure that non-leading powers

of $t$, called higher twists in the jargon, are numerically

insignificant for those values of $t$ that are experimentally

accessible. But if one simply assumes that all is well and that

the leading-power (leading twist) perturbation expansion is good

enough, there is the further problem that calculations usually

find that it is very slow to converge. Much has been written

about this problem$^1$, which is associated with the renormalisation-
scheme dependence of the expansion, and I do not have time to

discuss it here.

The conclusion must be that if experimental data seem to

agree with predictions based on simple applications of

perturbative QCD, we should be pleased, but if things are more

complicated we should not be too surprised.

2. ELASTIC SCATTERING AT LARGE $t$

Elastic scattering at small $t$ is characterised by a very

sharp peak in the forward direction. At sufficiently large

energy, a dip is found, around $t = -1.4 \text{ GeV}^2$ in the case of pp

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