Beauty at the LHC


*) Conveners.

ABSTRACT

The LHC is expected to produce unprecedented amounts of pairs of beautiful particles. A high energy hadron collider is arguably the only machine sufficiently luminous to analyse CP violation in the B-sector, and to discover particles that are both charmed and beautiful. In a collider mode the main difficulty, that we discuss at length, is the extraction of the signal from the humongous backgrounds. We offer commentary on the comparison with a fixed target mode of operation and with other machines, such as $e^+e^-$ Beauty-factories.

Organization

The various topics relevant to the analysis of beauty physics at future facilities are discussed here as separate contributions from the groups most directly involved in the various studies. An update of the standard theory of CP violation in the beauty sector, its predictions for the LHC and the fake asymmetries to be expected from the lack of particle-antiparticle symmetry of the initial state, as well as some new considerations concerning the production of $b\bar{c}$ states, are all discussed in the theoretical introduction. A. Fridman and collaborators have contributed detailed studies of the comparison of the physics potential of $e^+e^-$ and $pp$ colliders and the fixed target options of the latter. A crucial question is the feasibility of the search for CP-violation in the B realm in a collider mode. This is discussed in the form of a contribution devoted to a specific possibility of a collider experiment at the LHC. Three contributions discuss the potential of fixed target options at the LHC and the SSC.