APPLICATION OF THE - FORECASTING - PRONOSTIC METHOD TO THE EVALUATION OF P-P CROSS-SECTIONS AT VERY HIGH ENERGIES

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Prediction procedures of significant physical quantities represent a useful tool in drawing inferences about the behavior of the out-of-the range data and so, about the generator events, Theoretical predictions out of the range of a data set involves a certain degree of uncertainty. With the aim of evaluating the confidence of such predictions it is convenient to determine the uncertainty associated to the predictions of the data. In the context of p-p cross-sections at very high energies a great deal of work has been done out of the energy range of accelerators (> 1.8 TeV) using diferent models (single-pomeron, dipole-pomeron, multiple-diffraction. QCD and so on) to extrapolate the measured data to the range of futur accelerators, as is the case of the Large Hadron Collider, LHC, (14 TeV): such predictions are usually compared to Cosmic Ray data producing a disagreement in the energy tendency of cross- sections as expected from predictions, for which explanations have also been widely discussed in the literature. We claim that such comparison requires of highly confident band of uncertainty for any parametrization model. Several methods have been used to determine the accuracy degree of extrapolations, most of which are based on the minimization of the quadratic sums of data deviations relative to a proposed prediction model. Here, we present a statistical procedure - namely forecasting - based on the multiple regression method, that allows to determine the relevant uncertainty: predictions are developed on the basis of the multiple-diffraction model to estimate in the center of mass range 10-40 TeV ($10^{17} - 10^{18}$ eV in the lab), which covers both LHC and highest Cosmic Rays. Our study show that extrapolations without a trustful delimitation of error bands may agree with the results of Cosmic Ray experiments, because experimental error bands are very large, but as soon as such a delimitation is made the predicted energy dependence of p-p total cross-sections is, in general, flatter than that of cosmic ray results.