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Weibull model of multiplicity distribution in hadronic, leptonic and heavy ion collisions

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We introduce the use of the Weibull distribution as a simple parametrization of charged particle multiplicities in hadron-hadron collisions at all available energies, ranging from ISR energies to the most recent LHC energies. In statistics, the Weibull distribution has wide applicability in natural processes that involve fragmentation processes. This provides a natural connection to the available state-of-the-art models for multiparticle production in hadron-hadron collisions, which involve QCD parton fragmentation and hadronization. The Weibull distribution describes the multiplicity data at the most recent LHC energies better than the single negative binomial distribution. The study has been extended to leptonic collisions and heavy ion collisions. The Weibull regularity successfully describes the higher order multiplicity moments in both hadronic and leptonic collisons. The Weibull regularity, which reproduces the multiplicity distributionsalong with the genuine correlations, seems to be the optimal model to describe the multiparticle production process.

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