Single diffraction and elastic scattering in proton-proton collisions with the STAR detector at RHIC

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Abstract

The diffractive cross sections constitute a large fraction of total hadronic cross section in p+p collisions, however, due to its nonperturbative nature, the understanding of the fundamental properties of these processes highly reply on the experimental studies. In this talk, I will report the inclusive and identified charged-hadron spectra productions via single diffractive (SD) process in p+p collisions at $\sqrt{s} = 200$ GeV. We will also report on the particle ratios of $\bar{p}p$ and K/π produced via SD process and draw comparisons to the results from inclusive proton-proton collisions as well as theoretical model calculations.
In addition, the first measurement of the proton-proton elastic cross section at $\sqrt{s} = 510$ GeV will be presented. The dependences of the elastic cross section on the collision energy and the momentum transfer (t) will be discussed and compared to model calculations for the relevant physics implications.