

# XXVIII International Workshop on Deep Inelastic Scattering and Related Subjects



Contribution ID: 173

Type: **Contributed Talk**

## Helicity at Small $x$ : Bringing Back the Quarks

*Tuesday, 24 March 2020 15:06 (18 minutes)*

We find the small- $x$  asymptotics of the quark helicity distribution in the large- $N_c$  &  $N_f$  limit by numerically solving small- $x$  evolution equations derived in earlier works, where  $N_c$  is the number of quark colors and  $N_f$  is the number of quark flavors. Previously, those evolution equations were solved only in the large- $N_c$  limit. We find that  $\Delta q$  oscillates as a function of  $\ln(1/x)$  at small  $x$ , with the oscillation frequency being dependent on the number of quark flavors,  $N_f$ . Our result may account for the apparent oscillation in the strange quark helicity distribution  $\Delta s$  as a function of Bjorken  $x$ . For  $N_f = 0$ , these oscillations disappear; this is why they were not seen in the earlier large- $N_c$  studies. Our work presents the most precise theoretical determination of the small- $x$  asymptotics of the quark helicity distribution based on the Wilson line approach to small- $x$  evolution. When combined with the future EIC data, our approach should allow for a precise determination of the amount of the proton spin coming from small- $x$  partons, thus contributing to the resolution of the proton spin puzzle.

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**Session Classification:** Joint Session: WG2+WG5

**Track Classification:** Small- $x$ , Diffraction and Vector Mesons