

# Parton distribution functions of $\Delta^+$ on the lattice

*Friday, 7 August 2020 17:40 (20 minutes)*

We perform a first calculation for the unpolarized parton distribution function of the  $\Delta^+$  baryon using lattice QCD simulations within the framework of Large Momentum Effective Theory. Two ensembles of  $N_f = 2+1+1$  twisted mass fermions are utilized with a pion mass of 270 MeV and 360 MeV, respectively. The baryon, which is treated as a stable single-particle state, is boosted with momentum  $P_3$  with values  $\{0.42, 0.83, 1.25\}$  GeV, and we utilize momentum smearing to improve the signal. The unpolarized parton distribution function of  $\Delta^+$  is obtained using a non-perturbative renormalization and a one-loop formula for the matching, with encouraging precision. In particular, we compute the  $\bar{d}(x) - \bar{u}(x)$  asymmetry and compare it with the same quantity in the nucleon, in a first attempt towards resolving the physical mechanism responsible for generating such asymmetry.

**Primary author:** LI (\*), Yuan (Peking University)

**Co-authors:** CHAI, Yahui; XIA, Shicheng; ALEXANDROU, Constantia; CICHY, Krzysztof; CONSTANTINOU, Martha; FENG, Xu; HADJIYIANNAKOU, Kyriakos; JANSEN, Karl; KOUTSOU, Giannis; LIU, Chuan; SCAPELLATO, Aurora; STEFFENS, Fernanda

**Presenter:** LI (\*), Yuan (Peking University)

**Session Classification:** Hadron Structure

**Track Classification:** Hadron Structure