Contribution ID: **27** Type: **not specified**

Evaluation of Parton Distribution Functions and Generalized Parton Distributions from their Moments and Ioffe Time Behavior

Tuesday, 20 November 2018 10:50 (25 minutes)

The parton distributions obtained in lepton proton scattering experiments correspond to the Fourier transform of the quark-quark correlation function where the quark field operators are separated by a light cone distance known as Ioffe time. The Ioffe time behavior of the correlator can be determined unambiguously both in the short distance regime, through matrix elements of local operators accessible in lattice QCD, and at large distances, exceeding the proton size, using Regge asymptotics. We use this characteristic dependence of the correlation function to determine the x dependence of the u and d quark generalized parton distributions functions in the proton. We subsequently use Ioffe time distributions to study the properties of Transverse Momentum Distributions and the onset of factorization in QCD.

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Session Classification: Tuesday