

## Strange quarks in the proton

New HERMES results illuminate directly one of the basic features of the internal structure of the nucleon, the presence and contribution of strange quarks to its properties. HERMES found that the momentum and spin distributions for the strange quarks are substantially different from those previously assumed. The manner in which these partons contribute to the properties of the nucleon are described by parton distribution functions (PDFs). Because of the lack of an experimental probe sensitive to strangeness, we have had very limited information on the features of the PDFs for strange quarks. Now for the first time, using the technique of flavor tagging in deep inelastic scattering, the HERMES experiment has made a direct measurement of the strange quark PDFs. Flavor tagging is based on observation of hadrons produced in coincidence with the scattered electron. To probe strangeness, one detects the charged K-mesons which contain strange and anti-strange quarks.

The PDFs for strange quarks were determined from the measured yield of charged kaons per deep inelastic scattering event, *ie* the charged kaon multiplicity in a given interval of the parameter  $x$ . This parameter measures the fraction of momentum of the parent proton carried by the struck quark. The HERMES data (red points) reveal that the strange quark distribution is substantially different from the average of the non-strange antiquarks. The deviation of the shape of the strange PDF (See the dashed curve in the figure.) from that of light sea quarks (the dash-dot curve) is a clear violation of SU(3) flavor symmetry. This finding indicates that the nonperturbative QCD processes make a much larger contribution to the light quark sea than to the strange quark sea.

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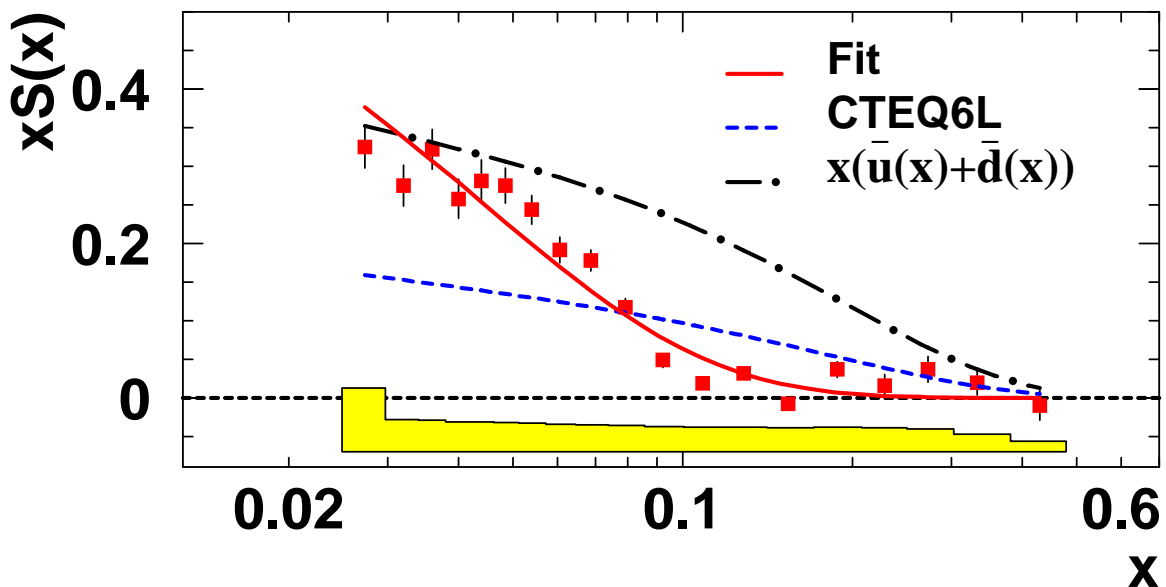


Fig. 1: The strange parton distribution from the HERMES measured multiplicity for charged kaons. The solid curve represents a fit to the HERMES data, while the yellow shaded area represents systematic error.