Abstract Submitted
for the DNP13 Meeting of
The American Physical Society

Possible diquark signatures in the elastic nucleon form factors
GORDON CATES, University of Virginia — There has been considerable interest in the elastic nucleon form factors ever since the discovery that the proton form-factor ratio, G_E^p/G_M^p, decreases nearly linearly above roughly $Q^2 = 1\,\mathrm{GeV}^2$. More recent measurements of the neutron form-factor ratio, G_E^n/G_M^n, up to $3.4\,\mathrm{GeV}^2$ have made it possible to constrain calculations using both proton and neutron data in the Q^2 regime where the interesting behavior of the proton was first observed. Calculations based on QCD's Dyson-Schwinger equations, as well as certain relativistic constituent quark models, suggest that the observed behavior is related to the importance of diquark degrees of freedom. To understand this connection, it is particularly useful to consider the flavor-separated form factors, which can be extracted by combining proton and neutron data, and assuming charge symmetry. Distinctly different behavior is seen for the $u-$ and $d-$quarks. The behaviors of the different quark flavors and the connection to diquarks can also be understood using naive scaling arguments, although this approach has yet to be made more rigorous. This talk will discuss how measurements of the nucleon form factors at high Q^2 provides a rich opportunity to better understand the structure of the nucleon.

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Date submitted: 01 Jul 2013 Electronic form version 1.4