Abstract Submitted
for the APR17 Meeting of
The American Physical Society

A Euclidean bridge to the relativistic constituent quark model[1]
TIMOTHY HOBBS, Univ of Washington, MARY ALBERG, Seattle University, GERALD MILLER, Univ of Washington — We explore the potential of a *Euclidean constituent quark model* (ECQM) to bridge the lingering gap between Euclidean and Minkowski field theories in studies of nucleon structure. Specifically, we develop our ECQM using a simplified quark-scalar diquark picture of the nucleon as a first calculation. Our treatment in Euclidean space necessitates a hyperspherical formalism involving polynomial expansions of diquark propagators in order to marry our ECQM with results from Bethe-Salpeter Equation (BSE) analyses. From this framework, we define and compute a new quantity — a *Euclidean density function* (EDF) — an object that characterizes the nucleon's various charge distributions as functions of the quark's Euclidean momentum. Applying this technology and incorporating information from BSE analyses, we find the quenched dressing effect on the proton's axial-singlet charge to be small in magnitude and consistent with zero, while use of recent determinations of unquenched BSEs results in a large suppression. The substantial effect we obtain for the impact on the axial-singlet charge of the unquenched dressed vertex compared to the quenched demands further investigation.

[1]Work supported by DOE grant DE-FG02-97ER-41014 and NSF Grant No. 1516105.

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Date submitted: 26 Sep 2016 Electronic form version 1.4