Abstract Submitted
for the SES13 Meeting of
The American Physical Society

Self Organizing Maps for Extracting Deep Inelastic Scattering Observables EVAN ASKANAZI, SIMONETTA LIUTI, KATHERINE HOLCOMB, University of Virginia — In Deep Inelastic Scattering, or DIS, the scattering cross section for proton-electron scattering and deuteron -electron scattering can be separated into a component that can be solved by perturbative QCD, or a "hard" section, and a component that can only be determined by scattering experiments, the "soft" section. The "soft" part of the scattering cross section, F_2^P for an electron scattering off of a Proton and F_2^D for an electron scattering off of a Deuteron, can be written as $\Sigma e_i q(x, Q^2)$ where $q(x, Q^2)$ is the Parton Distribution Function, or PDF, for each type of Parton that comprises the Proton or Deuteron and Σe_i is the charge of each proton type. The individual pdfs can only be parameterized based on fits to experimental data. A number of different collaborations, including CTEQ, MRST, GRV and MSTW, have attempted to parameterize the pdfs. We attempt to use the Self Organized Map to form our own parameterization of the pdfs, thereby allowing us to formulate a theoretical model for the soft part of the DIS cross section. The SOM is an Artificial Neural Network that uses unsupervised learning, which is a method of neural network learning molding an initial data set to a final data set without using the final set.

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Date submitted: 19 Sep 2013 Electronic form version 1.4