Proposal 4

Proposal to the
CEBAF
Program Advisory Committee

The Study of Excited Baryons at High Momentum Transfer
with the CLAS

The N* Group

-in the CLAS Collaboration-

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Abstract: It is proposed to measure the properties of excited nucleons at high $Q^2$
by means of exclusive single meson production. The motivation is to investigate short
range phenomena in the transition from the non-perturbative QCD regime, where theo-
retical descriptions have used non-relativistic, and relativized mean field models, to those
involving perturbative QCD (pQCD). Initial measurements will be carried out at $Q^2 \sim
3 - 4 \text{ GeV}^2/c^2$ at an incident electron energy of 4 GeV, utilizing the initial detection
capabilities of the CLAS spectrometer. Later measurements will be extended to higher $Q^2$
as electron detection acceptance and/or the electron beam energy increases. Among the
specific issues we wish to investigate are whether the form-factors of the larger amplitude
transitions approach the $Q^2$ dependence predicted by pQCD calculations, whether there
is significant longitudinal strength in the region of the Roper resonance, and whether the
anomalous behavior of the $S_{11}(1535)$ form factor continues at high $Q^2$. 

1