

Abstract for an Invited Paper
for the SES06 Meeting of
The American Physical Society

Mapping the Spectrum of Gluonic Excitations with Photons: The GlueX Project at Jefferson Lab

ALEX DZIERBA, Indiana University/Jefferson Lab

Understanding the confinement of quarks and gluons in QCD requires an understanding of the soft gluonic field – the clearest experimental manifestation of which is the spectrum of exotic hybrid mesons. These exotic mesons carry J^{PC} quantum numbers that are not possible for a simple quark – antiquark bound state but are possible when the gluonic degrees of freedom are included. There are tantalizing indications from existing data that exotic mesons do indeed exist but a mapping of their spectrum requires high quality data with a probe that is more likely to produce exotic hybrids. The GlueX detector design is optimized for the amplitude analyses to identify these states in multiple decay modes. It will also use a linearly polarized 9 GeV photon beam. Indeed, photons are expected to particularly efficient at producing exotic hybrids but to date photon beams of sufficient quality (flux, degree of polarization, spot size) have not been possible. The 12 GeV upgrade of the CEBAF accelerator at JLab, along with the construction of a new beam line and experimental hall (Hall D) to house the GlueX detector will provide the data needed to carry out this mapping of the exotic hybrid spectrum. The first two years of data-taking will result in a data set that exceeds existing data from photoproduction by several orders of magnitude. This talk will review the current experimental information on exotic mesons and the GlueX project goals and status.