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### **The Physics of the Jefferson Lab 12 GeV Upgrade<sup>1</sup>**

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Since 1995, the high luminosity, polarized electron beam of the Continuous Electron Beam Accelerator Facility (CEBAF) at Jefferson Lab (JLab) has provided a powerful experimental tool for our studies of the strong interaction and its theory QCD, and the structure of the proton, the neutron, and nuclei. The 12 GeV Upgrade of JLab, currently underway, will open a new era for frontier research in nuclear and hadronic physics. The new experimental Hall D will use the electron beam to produce a tagged coherent bremsstrahlung beam and will house a solenoidal detector to carry out a program in gluonic spectroscopy. It will experimentally test current understanding of quark confinement. The three existing halls (A, B and C) will be upgraded to receive the new 11 GeV beam. Halls B and C will house a new toroidal detector (CLAS12) and a new high momentum spectrometer (the SHMS) respectively. Hall A is anticipated to focus on experiments utilizing specialized apparatus. There have been four reviews of proposals by the Program Advisory Committee, which approved 45 experiments (13 being conditionally approved) in all four experimental halls. In addition to quark confinement, we are expecting to gain precision knowledge of the spin, flavor, and transverse structures of the nucleon and its valence quark structure; the nucleon generalized parton distributions; nucleon and meson form factors; and the quark and gluon structure of nuclei. High-precision parity violation experiments will test the electroweak Standard Model and will provide the potential to study possible new physics.

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