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Building nucleons and nuclei from quarks and glue: highlights of nuclear physics research at Jefferson Lab in the "6 GeV era"

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Collaboration

Abstract content

The intense, cw beams of polarized electrons with energies of up to 6 GeV from the Continuous Electron Beam Accelerator Facility (CEBAF) at Jefferson Lab have provided a unique tool for the study of atomic nuclei and their constituents. One hundred and seventy three experiments were carried out using the original accelerator configuration between 1995, when operations began, and 2012, when the facility ceased operation to start the 12 GeV Upgrade now nearing completion. These experiments advanced a broad range of nuclear physics research aimed at addressing key questions in the field, such as: how nucleons are constructed from the quarks and gluons of QCD; how the strong force arises from the underlying QCD quark-quark interaction; and where the conventional description of nuclei based on nucleons interacting via the nuclear force breaks down. Another major line of research emerged aimed at testing the Standard Model through very high precision experiments at low energies. The broad outlines of this research will be reviewed, and highlights from the program will be presented.

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