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12 GeV CEBAF: Accelerator Systems and Polarized Beams

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The final nuclear physics experiments with “6 GeV CEBAF” were conducted in 2012 at which point the accelerator complex was upgraded to double the beam energy and add a fourth experimental hall. The accelerator upgrade was split into two periods, a six month period preceding the final 6 GeV operations and an 18 month period post 6 GeV operations. Following completion of the upgrade work, the new accelerator was commissioned over a roughly two year period during five distinct runs totaling 36 weeks of operation. Milestones for these commissioning periods focused on achieving incremental success in different technical areas including learning how to simultaneously operate two cryoplants, finding optimum operating parameters for new “C100” cryomodules that employ new RF control systems, commissioning the new Hall D beam transport line, and multi-hall operation at the highest passes using new 750 MHz separator cavities. During the final commissioning run, the linacs operated at maximum design energy enabling 12 GeV beam delivery to Hall D and 11 GeV beam delivery to Hall A at high average current. Fall 2016 saw the official start of the 12 GeV physics program, with nuclear physics experiments performed at Halls A, B and D during an 11 week run. All of the halls received polarized beam, although only Hall A required it. Polarization was high ($> 80\%$) at 11 GeV eliminating concerns that increased levels of synchrotron radiation at the higher passes would serve to dilute beam polarization. The future holds challenges, notably, improving machine reliability and up-time, and maintaining linac gradient. This talk presents a summary of the CEBAF 12 GeV Upgrade –successes and setbacks –and future plans.

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