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Nuclear Physics Program at the Upgraded High Intensity γ -ray Source $(HI\gamma S)^1$ M.W. AHMED, Duke University and TUNL

Recent upgrades to the High Intensity γ -ray Source (HI γ S) at the Duke Free Electron Laser Laboratory have produced unprecedented γ ray intensities with selectable polarization and energy resolution. A newly commissioned 1.2 GeV Booster Injector has enabled the facility to deliver γ rays up to 65 MeV with sustained flux. Recently performed benchmark tests of the γ ray flux between 2 and 40 MeV will be presented. A broad nuclear physics program is in its initial phase of execution. The planned experiments include cross section measurement of key reactions in nuclear astrophysics, nuclear structure studies, measurements of the Gerasimov-Drell-Hearn (GDH) sum rule integrand for d and ³He, and measurement of electromagnetic and spin polarizabilities of nucleons. An overview of the experiment to measure the ${}^{16}O(\gamma, \alpha){}^{12}C$ reaction cross section in order to determine the cross section of the inverse reaction at astrophysically relevant energies will be presented. A brief report on nuclear structure studies involving parity assignments and transition strengths will be presented. Lastly, experiments have been designed to improve the presently available data on the proton and the neutron electromagnetic polarizabilities and to provide the first data on the spin polarizabilities of the nucleons.

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