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CW RF System for the ATLAS Efficiency and Beam Intensity Upgrade

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In order to increase beam transmission efficiency and intensity of ion beams, a major upgrade project has been conducted at Argonne Tandem Linac Accelerator System (ATLAS). A 4-meter long 60.625 MHz CW radio-frequency quadrupole (RFQ) has been developed, built and commissioned with beam in 2012. The RFQ has been used in the regular operation since January, 2013 and is capable of providing 295 keV/u for any ion from proton to uranium. A new cryomodule Booster A consisting of seven 72.75 MHz superconducting (SC) quarter-wave resonators (QWR) has also been developed and installed in 2013. This cryomodule was commissioned in Feb. 2014 and demonstrated acceleration voltage about 3 MV per cavity which exceeded the required performance of maximum 2.5 MV per cavity. Transmission through Booster A is almost 100%. In this paper, the new CW RF system is presented. Two 60 KW electron tube type amplifiers are controlled to provide the power for the 60.625 MHz RFQ. The resonance frequency is regulated to the master oscillator (MO) frequency by adjusting the cooling water temperature. Seven 4 KW solid state amplifiers are used to operate the cryomodule in the overcoupled mode. Circulators and dummy loads are used to protect the amplifiers.

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