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Upgrade of the High Brightness Photo-injector System at NSRRC

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NSRRC high brightness photo-injector has been built to generate intense ultrashort electron bunches for novel accelerator-based light source development. The injector is equipped with a laser-driven photocathode rf gun and a 5.2-m long S-band traveling-wave linac for beam acceleration. The electron bunch is compressed near the linac rf zero crossing phase by the so-called velocity bunching technique. Based on autocorrelation technique the bunch length is measured with the THz coherent transition radiation (CTR) generated by passing the ultrashort electron beam through a metallic foil. Before 2019 the electron bunch length is measured to be 490 fs due to insufficient linac field. Recently the original Thales TH2100A klystron was replaced by the Canon klystron to provide higher rf power in the linac. Currently, the electron bunch length is further compressed to be 240 fs when the linac field gradient increased from 9.8 to 13.8 MV/m. The detailed upgrade process and relative light source development are presented in this paper.

Footnotes

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