MOPGF023 Update of Power Supply Control System at the SAGA Light Source Storage Ring Y. Iwasaki, Y. Takabayash, T. Kaneyasu, S. Koda, SAGA Light Source, Tosu, 841-0005, Japan

Abstract

The control system for the SAGA Light Source storage ring power supplies is being upgraded to increase the ramp-up speed and allow the stored beam energy to be easily changed. By replacing the CPU module in the PLC used to control the power supplies, the ramp-up time was reduced from 4 to 2 minutes in a test bench prepared for the upgraded system. To operate the storage ring at an arbitrary energy, the algorithm used in the PLC program was changed. The resolution at which the energy can be changed is less than 1 MeV. The upper layer of the control system using National Instrument LabVIEW and ActiveX CA was also reconstructed for flexible GUI. Preliminary measurements of the energy dependence of the beam size and lifetime were carried out using the updated control system.



The current of the bending magnet power





$$i_{\text{target}} = E^{-1}(E_{\text{target}}).$$

Interpolate and round off to the nearest whole number.





Energy Dependent Measurements



Beam size measurement by SR interferometer system [4]

The transverse beam size from injection energy of 255 to maximum energy1.4 GeV.

Since the SR interferometer system is optimized to measure the beam size at 1.4 GeV, the results of over 800 μm of horizontal and 1000 μm of vertical, respectively, are unreliable.

We replaced the CPU module of PLC for improve the ramp-up speed.

The ramp-up time was reduced from 4 to 2 minutes in a test bench prepared for the upgrade system.

The algorithm and GUI of the control system were modified to easily change the operation energy of the storage ring. Resolution < 1 MeV.

Preliminary beam size and lifetime measurement at several energies was carried out. The observed lifetime peak at about 0.6 GeV may be related to

Beam life-time measurement

The product of beam current and lifetime is shown in the left figure. The growth of life-time at the energy near 0.6 GeV may be related to the blow-up of vertical beam size (by ion trapping).

The increase of Tauschek lifetime may courses the increase of lifetime over the energy of 1 GeV.

The detailed measurements and quantitative estimation of energy dependence for beam size and lifetime have not been performed yet. ^{1.4} However, energy-dependent experiment will be

easily carried out using the updated system.

an increase in the vertical beam size.

We will investigate the energy-dependent ion trapping and Intra-beam scattering (IBS) effect at the SAGA-LS storage ring using the updated system.

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SUMMERY

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