Contribution ID: **462** Contribution code: **THPM071** Type: **Poster Presentation**

Synchronous phase measurement and study at the Taiwan Photon Source

Thursday 5 June 2025 15:30 (2 hours)

A bunch-by-bunch synchrotron phase and beam phase detector system has been implemented to investigate the synchronous phase behavior of the storage ring and booster ring at the Taiwan Photon Source. These detectors employ I/Q demodulation to compute the beam phase and deliver data at a bunch-by-bunch, turn-by-turn, and 3 Hz frequency. The collected data is seamlessly integrated into the accelerator's control system, displayed in the graphical user interface, and is available for further analysis. Independent component analysis and numerical analysis of fundamental frequencies are utilized to examine the sources within the storage ring and assess the synchrotron frequency and phase variation during the energy ramping of the booster ring. The results indicate that the phase difference between the head and tail bunch, as well as the average phase drift across all bunches, are approximately proportional to the total beam current, both hovering around 1.4 degrees. This phenomenon is attributed to the high-quality value of the superconducting radio frequency (RF) cavity in the storage ring. A 7 kHz in-phase synchrotron phase variation is observed, originating from the switching frequency of the transmitter in the RF system. Additionally, a 40-degree phase drift is noted during the booster's ramping process, primarily arising from the mismatch between the booster currents and the RF gap voltages.

Footnotes

Paper preparation format

Word

Region represented

Asia

Funding Agency

Author: HUANG, Chih-Hsien (National Synchrotron Radiation Research Center)

Co-authors: WU, Chunyi (National Synchrotron Radiation Research Center); CHEN, Jenny (National Synchrotron Radiation Research Center); LIAO, Jin-Kun (National Synchrotron Radiation Research Center); HSU, Kuo-Tung (National Synchrotron Radiation Research Center); LEE, Shu-Hwa (National Synchrotron Radiation Research Center); CHENG, Yung-Sen (National Synchrotron Radiation Research Center)

Presenter: HUANG, Chih-Hsien (National Synchrotron Radiation Research Center)

Session Classification: Thursday Poster Session

Track Classification: MC6: Beam Instrumentation and Controls,Feedback and Operational Aspects: MC6.T03 Beam Diagnostics and Instrumentation