Contribution ID: **375** Contribution code: **WEPMO19** Type: **Poster Presentation**

Longitudinal Profile Measurements of Particle Beams with Deconvolution in the APS-U Storage-ring *

Wednesday 10 September 2025 16:00 (2 hours)

Accurate measurement of the longitudinal profile, or bunch length, of particle beams is essential for evaluating and optimizing beam quality in the Advanced Photon Source Upgrade (APS-U) Storage Ring. While Beam Position Monitor (BPM) signals are typically used for precise position measurements, they also contain information about the longitudinal bunch distribution, convolved with the BPM system's transfer function. To extract the true bunch profile, CST Studio is used to simulate the BPM response to a short Gaussian pulse—approximating a Dirac delta function—thereby providing the BPM's transfer function. The transfer functions of signal cables and attenuators are also measured and combined with the simulated BPM response to construct a complete system transfer function. This composite response serves as the deconvolution kernel for reconstructing the original time-domain bunch profile from the measured BPM signals. BPM signals from the APS-U's tuned Bunch Lengthening System (BLS) are analyzed in both time and frequency domains. Deconvolution with the simulated transfer function yields accurate longitudinal profiles and enables precise extraction of bunch lengths.

Footnotes

*Work supported by the U.S. Department of Energy, Office of Science, under Contract No. DE-AC02-06CH11357.

Funding Agency

I have read and accept the Conference Policies

Yes

Author: SUN, Xiang (Argonne National Laboratory)

Co-authors: CHENG, Weixing (Argonne National Laboratory); BRILL, Adam (Argonne National Laboratory)

Presenter: CHENG, Weixing (Argonne National Laboratory)

Session Classification: WEP

Track Classification: MC03: Beam Position Monitors