Contribution ID: **16** Contribution code: **THP29** Type: **Poster Presentation**

Position-phase error cancellation effects in beam-based linac alignment and synchronization

Thursday 4 September 2025 18:55 (1h 35m)

As prerequisites for automatic phase setting and fault compensation, precise longitudinal alignment and RF phase calibration are critical for high-intensity superconducting hadron linacs. While multiple facilities have successfully aligned or synchronized their linacs with time-of-flight (TOF) beam-based methods, existing error analyses typically assume uncorrelated position and phase uncertainties. This work rigorously derives intrinsic correlations between position and phase errors in beam-calibrated linacs. We demonstrate how these correlations can induce error cancellation effects that improve the accuracy of energy measurements and phase setting. Having validated these effects through simulations, we analyzed their implications for beam-based calibration experiments with applications to HIAF and CiADS commissioning.

Footnotes

Funding Agency

I have read and accept the Privacy Policy Statement

Yes

Author: ZHOU, Haoyu (Institute of Modern Physics, Chinese Academy of Sciences)

Co-authors: WONG, Chun Yan Jonathan (Institute of Modern Physics, Chinese Academy of Sciences); DU, Yu (Institute of Modern Physics, Chinese Academy of Sciences); MA, Binghui (Institute of Modern Physics, Chinese Academy of Sciences)

Presenter: ZHOU, Haoyu (Institute of Modern Physics, Chinese Academy of Sciences)

Session Classification: Poster Session

Track Classification: MC2: Beam Dynamics and EM Fields