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Quantitative description and correction of longitudinal drifts in the Fermilab linac

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The Fermilab Linac accepts the 0.75 MeV H⁻ ions from the front end and accelerates them to 400 MeV for injection into the Booster. Day-to-day drifts of the longitudinal trajectory in the Linac, reconstructed from phase readings of Beam Position Monitors, are at the level of several degrees. They are believed to cause additional losses both in the Linac and Booster, and are addressed by empirically adjusting the phases of Linac cavities. This work explores the option of expressing these drifts in terms of phase shifts in two cavities at the low-energy part of the Linac. Such description allows for a simplified visual representation of the drifts, suggest a clear algorithm for their compensation, and provides a tool for estimating efficiency of such compensation.

Footnotes

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