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Feasibility study of electron beam probe based longitudinal bunch shape monitor in high-intensity proton linac

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The knowledge of the longitudinal bunch shape is of high interest to accelerator performance optimization and advanced beam application. Attracted by the ability to continuously monitor the beam in real time, there is always a demand for bunch-by-bunch and non-invasive diagnosis. However, such diagnosis is difficult to achieve for proton beam with high intensity and high repetition. Using the principle of electron beam deflection, electron beam probe has the potential of multi-function beam diagnosis. Here, we proposed the concept of real-time longitudinal bunch shape monitor with photocathode DC electron gun. Considering the realistic bunch distribution, we investigated the feasibility of this monitor using particle tracking simulation. The results and analysis of feasibility are reported in this paper.

Footnotes

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