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## Absolute charge measurements for ps-long bunches using a wall current monitor in linac-based free electron lasers

*Thursday, 12 September 2024 16:00 (1h 30m)*

Wall current monitors (WCMs) are devices used to measure the bunch charge or current profile of a charged particle beam. They are commonly perceived as absolute charge measurement devices, which is not really true, since the pickup response at DC is zero. A charge value has to be determined from the variation of the output signal. For very short bunches of picosecond length, this becomes more and more affected by ferrite losses and the general wide band frequency behaviour of the WCM geometry. In this paper, a new method is proposed to determine the absolute bunch charge of a few picosecond-long electron bunch by analysing and processing the WCM waveforms. We present a detailed characterization of the WCM in operation at SwissFEL by means of an equivalent circuit model, numerical methods and test bench measurements. The results thus obtained are compared with charge measurements obtained from other monitors operating along the SwissFEL linear accelerator. The extensive characterization of the WCM allowed in combination with the waveform processing technique to derive, for the first time, the absolute charge of a single ps-long electron bunch.

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### Footnotes

### Funding Agency

### I have read and accept the Privacy Policy Statement

Yes

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