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## Using transimpedance amplifiers for current measurements of long beam pulses

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CERN H- Linac 4 (L4) and ion Linac 3 (L3) operate with millisecond beam pulses, which pose a challenge for beam current measurements based on Fast Beam Current Transformers (FBCTs). In the past the low cut-off frequencies of the FBCTs were actively lowered using a combination of transimpedance (TI) amplifiers and integrating amplifiers. Unfortunately, in many locations such amplifiers were sensitive to interference from neighbouring power systems. The situation was particularly difficult in L3, where in addition to long beam pulses, the challenge was also small beam currents. The interference problems had been addressed for years with limited success and finally it was decided that the whole FBCT front-end electronics should be renovated, with the main objective being to improve the immunity to interference. This paper describes the evolution of the FBCT front-end electronics and installations, which has finally allowed reliable beam current measurements, whose examples are provided. The key improvement was the use of small TI amplifiers directly connected to the FBCTs, which in addition simplified installations in both linacs. The TI amplifiers provide an active low impedance load to the FBCTs, extending their time constants by some two orders of magnitude, as compared to operation with a 50 Ohm load. Challenges of the TI amplifier implementation are described, along with particularities of their beam commissioning.

### Footnotes

### Funding Agency

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Yes

**Primary author:** GASIOR, Marek (European Organization for Nuclear Research)

**Co-authors:** ALVES, Diogo (European Organization for Nuclear Research); DOLENC, Miha (European Organization for Nuclear Research); RUFFIEUX, Romain (European Organization for Nuclear Research)

**Presenter:** GASIOR, Marek (European Organization for Nuclear Research)

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