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Fast kickers for bunch by bunch feedbacks at SLS 2.0 and ELETTRA

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The accelerator upgrades of SLS and Elettra will use newly designed kickers adapted for their small aperture beam pipes.

The striplines of the transverse kickers conform closely to the aperture of the beam pipe with special grooves to avoid synchrotron light on the blades. The multitude of trapped higher order modes, caused by a high beam pipe cut-off frequency and dangerous in terms of stability and heat up, is suppressed by lossy silicon carbide dampers. The devices feature integrated pumping ports. The transverse shunt impedance improves by a factor of four compared to the current SLS/Elettra kicker.

The longitudinal kicker is a heavily coupled cavity at 1.875 GHz ($3.75 * RF$) with four input and four output couplers for driver and loads. A nose cone design optimizes the shunt impedance resulting in a 20% improvement over the current SLS/Elettra kicker. Also here, the high cut-off frequency of the beam pipe caused problematic higher order modes, which needed to be damped by higher order mode couplers. A dedicated field sensor pickup will be used to synchronize the feedback to the bunch train.

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Footnotes

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Yes

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