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SwissFEL C-band Linac and S-band Linac for FERMI

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The SwissFEL 6 GeV electron Linac utilizes 104 C-band copper accelerating-structures of 2m length each. For series production of these structures PSI has developed together with industry a new production process. The key features of this process are on-tune ultra-precision machining and vacuum brazing of the full stack of cups together with the couplers in a single brazing step. This process proofed to be very reliable and robust, not a single structure was lost in the production process, during high power conditioning and in operation. The field flatness, structure straightness and high field properties are consistently very good. Because of the on-tune machining neither a tuning procedure nor design provisions for such a procedure are required.
Since the completion of the C-band series in 2016 the same process has also been applied to X-band prototypes for CLIC and, in a collaboration with CERN and DESY, for X-band deflectors used for femtosecond scale beam diagnostic. For the C-band structures acceleration of up to 50MV/m was demonstrated, the X-band structures reach acceleration fields in excess of 100MV/m in the CLIC RF testing facility at CERN. Currently a collaboration of PSI with FERMI at ELETTRA aims at qualifying the same process for 3m long S-band structures with an operational acceleration field in excess of 30MV/m. A short test structure was already successfully tested at FERMI up to 35 MV/m with extremely low breakdown rate.
The talk gives an overview of the technology and discusses a possible use in the FCC-ee injector.

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