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SLS 2.0 storage ring upgrade overview

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The Swiss Light Source, SLS, storage ring has been rebuilt as SLS2.0, to improve the radiation brightness by about two orders of magnitude. All components of the storage ring lattice and its supporting infrastructure are newly constructed and were installed during a 15-month shutdown that began in October 2023. The linac and booster synchrotron received only small modifications with the exception of a new power supply for the main magnet circuit with its 3 Hz current ramp.
The new 7 bend achromat arcs had to fit the existing tunnel footprint and the location of the beamline exit ports resulting in tiny distances between magnets. In addition, all bends (and reverse bends) are based on permanent magnets necessitating thorough cross-talk studies due to larger stray magnetic field. The high density of magnets prevented the installation of vacuum bellows required for in-situ bake-out, so the twelve vacuum arc strings, of 18 m in length each, were installed in the ring after activation and pumping to a pressure around 1.e-11 mbar. Four HOM damped RF cavities at 500 MHz are installed in a row and supplied by four solid-state amplifiers of 150kW each. Two beamlines are dedicated to beam diagnostics and newly developed BPM and feedback systems monitor and stabilize the beam. This paper describes the main challenges faced during the SLS storage ring upgrade and gives an overview of the presently achieved performance. Beam commissioning details are described in a companion paper.

Footnotes

Paper preparation format

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Region represented

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