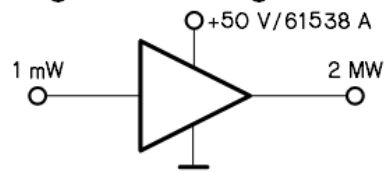


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ESRF RF system for the new ultra low emittance machine EBS: performance and upgrade projects

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After 25 years of service to users, the world's first 3rd generation storage ring light source at the ESRF was shut down in December 2018 to leave the space for the first high energy 4th generation ultra low emittance ring, the Extremely Brilliant Source EBS. The new machine was started as scheduled in December 2019 and fully commissioned by the end of February 2020. Service to users was resumed as planned end of August 2020 after beam line commissioning. For the new machine the five-cell LEP type cavities were replaced with 13 in house developed strongly HOM damped cavities. Thanks to reduced dipole radiation, only one of the two remaining klystron transmitters and the three existing Solid State Amplifiers (SSA) are required to power the new ring and still provide operational redundancy. The upgraded 352 MHz RF system was fully operational and very reliable from day zero, and nominal beam current of 200 mA could be stored in record time. Yet a number of projects are underway to further improve the EBS RF system.

In 2021 a call for tender for the procurement of ten 110 kW SSA was launched and, after selection among six received offers, a contract was signed with JEMA France. The now already 30 years old klystron transmitters will definitely be shut down after the connection of the last cavity to its SSA end of 2026. Furthermore an active 4th harmonic RF system at 1.41 GHz is under study for bunch lengthening in order to increase the Touschek lifetime, minimize intrabeam scattering and reduce impedance heating mainly when the ring is operated with high currents per bunch. Normal conducting harmonic cavities are being developed at the ESRF.

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