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Energy saving measures in the high-power RF system of the European XFEL

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The high-voltage modulators of the 26 klystrons in the XFEL represent the largest power consumer of the accelerator facility. The beam energy is usually 14 GeV, but a few weeks a year, lower and higher beam energies are also produced. For example, 11.5 and 16.3 GeV. Until mid-2022, the modulator voltages were set so that enough RF power for 16.3 GeV beam energy could be provided at all times. In order to save energy, the modulator voltages will now be lowered to a sufficient level for beam energies of ≤ 14 GeV. In this way, the previous power consumption of the modulators of 5 MW can be reduced up to 1 MW depending on the operation mode. Over the course of a year, this will save several GWh of energy. In the following, the relationship between the output voltage and the power consumption of the modulators is described. Afterwards, it is reported how the power consumption was reduced in various operating conditions in 2022.

Funding Agency

Footnotes

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Yes

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