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Status and plans for the upgrade of the PETRA IV RF system

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In the framework of the planned upgrade of PETRA III to the fourth-generation light source PETRA IV at DESY, it is necessary to replace the more than forty-year-old RF system with state-of-the-art components to suppress coupled-bunch instabilities caused by parasitic higher-order modes (HOM). The plan is to install single-cell normal-conducting HOM-damped cavities, each driven by a high-power solid-state amplifier (SSA) at the fundamental frequency of 500 MHz. In order to suppress the negative effects of Touschek and intrabeam scattering, a third harmonic system is foreseen which lengthens the bunches and reduces their charge density. The RF system will be controlled by a low-level RF system based on the microTCA platform. In 2023, a prototype of the fundamental RF system was installed in PETRA III, which contains a HOM-damped cavity driven by a 120 kW SSA that can be operated in parallel with the existing RF system. This paper describes the planned design of the PETRA IV RF system and reports on the first results of the performance of the fundamental prototype system with beam.

Footnotes

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Primary author: FRÖHLICH, Nils-Oliver (Deutsches Elektronen-Synchrotron)

Co-authors: CHRISTOU, Chris (Diamond Light Source Ltd); HÜLSMANN, Peter (Deutsches Elektronen-Synchrotron); ONKEN, Ruediger (Deutsches Elektronen-Synchrotron)

Presenter: FRÖHLICH, Nils-Oliver (Deutsches Elektronen-Synchrotron)

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