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The path to high duty cycle (HDC) at EUXFEL: cryomodule developments

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The European XFEL is in operation since 2017 with a maximum energy of 17.5 GeV in short-pulse (SP) mode, consisting of 0.65 ms-long bunch trains at 10 Hz repetition rate. The accelerator can deliver up to 2700 electron bunches every 100 ms, with a spacing between bunches of 220 ns. After eight years of successful operation the accelerator team, with strong support from the XFEL strategy process, is working to define an accelerator upgrade scenario for possible implementation in the next decade. The main goal of the upgrade is to facilitate more bunches per second with larger bunch spacing while maintaining the high energy of the beam, a world record amongst FEL machines. Possible scenarios include continuous-wave (CW) and long-pulse operating modes, collectively referred to as high duty cycle (HDC). This paper describes the different operating modes under investigation and the R&D activities ongoing at DESY to support the upgrade. The main focus of the paper is on the cryomodule and cavity design modifications, while also giving a brief introduction of the other challenging aspects connected to the upgrade.

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Footnotes

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