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Development of APPLE-III Undulators for FLASH

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The implementation of a helical afterburner undulator at DESY's VUV-FEL source is part of the current FLASH2020+ upgrade program. The device shall be installed downstream of the present FLASH2 SASE undulators and will provide radiation with variable polarization from 1.33 nm to 1.77 nm (890-700eV) and thus also cover the L-edges of the 3d transition metals Fe, Co, and Ni. Despite a moderate energy upgrade of the machine to 1.35 GeV, the required wavelengths and tunability range can only be reached by a high magnetic performance of the undulator.

We report on design and development of an APPLE-III undulator with 17.5 mm period length operating at a minimum magnetic gap of 8 mm which will make use of a magnetic force compensation scheme. A short prototype has been built to verify and iterate both the mechanical and magnetic concept. Details on keeper design, prototype results and the tuning concept will also be discussed. The full length device is presently under construction and shall also verify this concept for the future seeding undulators at FLASH1.

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Yes

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