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Magnetic Measurements and Tuning of an APPLE-III Undulator for FLASH at DESY

An APPLE-III undulator of 2.5m length with a period length of 17.5mm has been developed at DESY within the last years. The device makes use of a magnetic force compensation scheme and provides arbitrarily polarized radiation. The undulator serves as a full-scale prototype for 6 further APPLE-III presently constructed within the FLASH2020+ seeding upgrade program. It has been successfully commissioned earlier this year as a 3rd harmonic afterburner at the FLASH2 SASE line.
The tuning of individual half-periods of the magnet structure had been implemented by a wedge-driven flexor mechanism in the magnet keepers which carry two half-periods each. Pairing of AB-magnet pairs based on Helmholtz measurements could already reduce the scattering of the magnetic moment across all keepers. For magnetic sorting, all mounted keepers had been individually characterized by a dedicated compact stretched wire built for this project. Tuning of the completed magnet structure as function of gap and phase was accomplished by a Hall probe bench.

Primary author: TISCHER, Markus (DESY)

Co-authors: GÖTZE, Kathrin (DESY); NEUMANN, Paul (DESY); VAGIN, Pavel (DESY)

Presenter: TISCHER, Markus (DESY)