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RF Commissioning and First Beam Operation of the PolariX Transverse Deflecting Structures in the FLASH2 Beamline

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In January 2021 two X-band (12 GHz) PolariX Transverse Deflecting Structures with variable streak polarization were installed into the FLASH2 beamline at FLASH. Since none of the RF components for the FLASH2-PolariX RF-distribution system nor the two PolariX structures could be pre-conditioned, RF-conditioning was and is quite tedious. Nevertheless, after 6 weeks of conditioning, we have already been able to streak the electron beam enough to start commissioning of the PolariX controls and the software.
After 4 months of conditioning in parallel to FLASH2 user operation, we achieved a stable 5.5 MW flat top of 400 ns operation. Next step will be to include RF pulse compression to achieve the design power of 22 MW. Since then operational experience with the PolariX system has continuously evolved and it has quickly become a valuable if not indispensable tool for tuning FLASH2. Even with the reduced power, a measurement resolution of 12 fs could be reached.
In this article we describe key aspects of the conditioning and commissioning process as well as the first experiences and first results of beam measurements both for SASE tuning and for dedicated micro-bunching studies.

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