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X-ray Gas Monitor operation at European XFEL above 25 keV

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X-ray Gas Monitors (XGMs) are operated at European XFEL for non-invasive single-shot pulse energy measurements and average beam position monitoring. The basic mechanism is photo-ionization of rare gas atoms. They are used for machine SASE tuning and for sorting single-shot experimental data according to the pulse energy. The XGMs were developed at DESY based on the specific requirements of European XFEL. In this contribution we will present the XGM operation at photon energies above 25 keV. We will discuss how we extrapolated the cross-sections and ion-mean-charges with an increased uncertainty into these high photon energies and how we want to improve the precision of these values in the future. For the XGM single-shot signal we use the Huge Aperture MultiPlier (HAMP), because the standard X-ray Gas Monitor Detectors (XGMDs) do not give reliable signal-to-noise above 18 keV even at highest operating gas pressures. We will present single-shot correlations between consecutive XGMs operated with HAMP. We discovered an intra-train non-linearity of the HAMP signal and studied operation parameters to mitigate this effect. Additionally, we will report the limit of the single-shot resolution which we found at 4.5 MHz where the HAMP peaks are overlapping.

Journal of Synchrotron Radiation Special Issue: will you submit your contribution?

yes

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