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Type: **Invited talk**

MHz-rate Beam Position and Pulse Energy Measurements with a Diamond Sensor at European XFEL

Thursday 29 August 2024 18:00 (15 minutes)

The diagnostics of the X-ray beam properties has a critical importance at the European X-ray Free Electron Laser facility. Besides existing diagnostic components, utilization of a diamond sensor was proposed to achieve radiation-hard, non-invasive beam position and pulse energy measurements for hard X-rays [1]. In particular, at very hard X-rays diamond-based sensors become a useful complement to gas-based devices which lose sensitivity due to significantly reduced gas cross-sections. A semiconductor detector based on a single crystal chemical vapor deposition (scCVD) diamond with a duo-lateral configuration for position sensitivity was proposed and successfully used at the synchrotron environment [2]. The first results obtained with a similar diamond sensor placed in the photon tunnel of European XFEL demonstrates pulse-resolved X-ray beam position within less than 1% uncertainty at 2.25 MHz [3]. The measurements presented in this work were performed with diamond sensors having similar properties and structure but with a different resistive coating. Here pulse-resolved beam intensity and position measurements performed at the Material Imaging and Dynamics (MID) instrument [4] at the European XFEL are presented.

References:

1. T. Roth, W. Freund, U. Boesenberg, G. Carini, S. Song, G. Lefeuvre, A. Goikhman, M. Fischer, M. Schreck, J. Grünert & A. Madsen. J. Synchrotron Rad. 25 Vol 25 (2018), Pg 177-188.
2. K. Desjardins, M. Bordessoule, M. Pomorski. J. Synchrotron Rad.. Vol 25 (2018), Pg 399-406.
3. T. Çonka Yıldız, W. Freund, J. Liu, M. Pomorski and J. Grünert. Optica Vol 10(8) (2023) Pg 963-964.
4. A. Madsen et al. J. Synchrotron Rad. Vol 28 (2021) Pg 637-649.

I plan to submit also conference proceedings

Yes

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