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Corrigendum

Corrigendum to ultrafast anisotropic disordering in graphite driven by intense hard X-ray pulses☆

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Since performing the analysis presented in Ref. [1], we have become aware that the values quoted in the original paper for the incident X-ray pulse intensities and fluences, and hence the absorbed doses in the sample, are incorrect. These values were calculated using the fluence present in the beam as it exits the undulator, and did not account for losses in the subsequent propagation and focusing. Due to filtering and the use of KB mirrors to achieve a nanometer-scale focus [2,3], the transmission from the measured point is just over 25%, significantly reducing the energy incident onto the target. While this Corrigendum does not affect the scientific results obtained, the corrected values should be noted and used in any comparison between the results from this beamtime [1,4] and future work.

Accounting for the X-ray beams losses, we find an on-target pump beam intensity of $1.6 \pm 0.5 \times 10^{19}$ W/cm^2 (fluence of $1.1 \pm 0.4 \times 10^5$ J/cm^2). As before, the energy deposition in the sample is estimated by the XCascade code [5], the results of which are shown in Fig. 1. According to these calculations, the average dose in the focal spot after the photoelectron cascades are completed is ~1.5 eV/atom. Since this correction does not affect the diffraction results, which imply that sample disordering proceeds by removal of intact sheets, our results are now in much better agreement with the theoretical work of Jeschke et al., [6], which predicts such a disordering mechanism in laser heated graphite for absorbed doses between 2.0 ± 0.4 and 3.3 ± 0.3 eV/atom.

The authors would like to apologize for any inconvenience caused.

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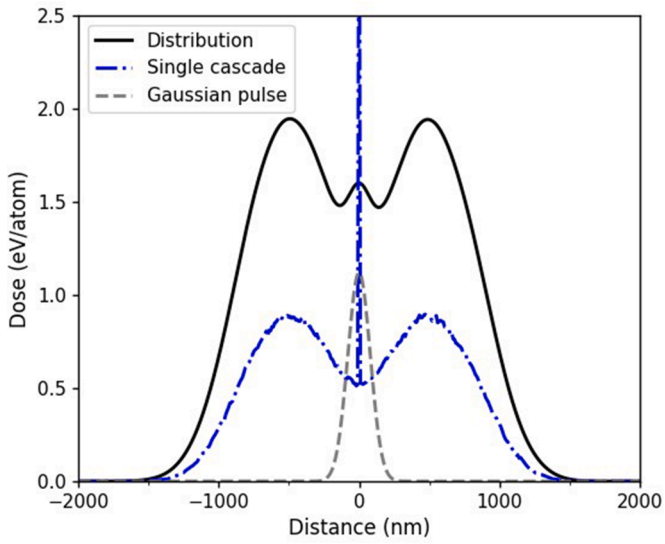

Fig. 1. Calculation of the heating range by the X-ray driven electron cascades. The dot-dashed line (blue) shows the range from a single cascade, while the solid line (black) shows the convolution of this with the focal spot size (dashed gray). The simulation assumes that all electrons are emitted parallel to the polarization; in reality they follow a $\cos^2$ distribution, which might slightly reduce the calculated energy spread.

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