Dataset for

Quantifying electron cascade size in various irradiated materials for free-electron laser applications, J. Synchrotron Radiat. 29, 323 (2022)

This dataset contains the results of Monte Carlo simulations presented in Ref. [1], with the model developed in Ref. [2]. The files for various materials (see file names) have the following format. The first three lines are comment lines with a reminder of what is in the columns. Then, the columns contain the following data:

1. Incident photon energy in [eV]
2. Duration of the electron cascade defined as the full width at half maximum of the electron density increase in [fs] (for the definition, see Refs. [3,4])
3. Duration of electron cascade defined as the time instant where the electron density reaches 90% of its maximum in [fs]
4. Number of excited electrons by the end of the cascade [electrons per photon]
5. Photoelectron range defined as the distance between the photon absorption point and the final position of the photoelectron in [nm] (for details of the definition, see Ref. [1])
6. Cascade size defined as the distance between the photon absorption point and the farthest electron in the cascade produced in [nm] (for details, see Ref. [1])
7. Auger electron range defined as the distance between the Auger-decay point and the final position of the Auger-electron in [nm], averaged over all Auger-electrons in a cascade (for details, see Ref. [1])

References

[1] V. Lipp, I. Milov, N. Medvedev, Quantifying electron cascade size in various irradiated materials for free-electron laser applications, J. Synchrotron Radiat. 29 (2022) 323–330. https://doi.org/10.1107/S1600577522000339

[2] V. Lipp, N. Medvedev, B. Ziaja, Classical monte-carlo simulations of x-ray induced electron cascades in various materials, in: Proc. SPIE - Int. Soc. Opt. Eng., 2017: pp. 102360H–102360H–9. https://doi.org/10.1117/12.2267939

[3] N. Medvedev, Femtosecond X-ray induced electron kinetics in dielectrics: application for FEL-pulse-duration monitor, Appl. Phys. B. 118 (2015) 417–429. https://doi.org/10.1007/s00340-015-6005-4

[4] N. Medvedev, Correction to: Femtosecond X-ray induced electron kinetics in dielectrics: application for FEL-pulse-duration monitor (Applied Physics B, (2015), 118, 3, (417-429), 10.1007/s00340-015-6005-4), Appl. Phys. B Lasers Opt. 125 (2019) 80. https://doi.org/10.1007/s00340-019-7182-3