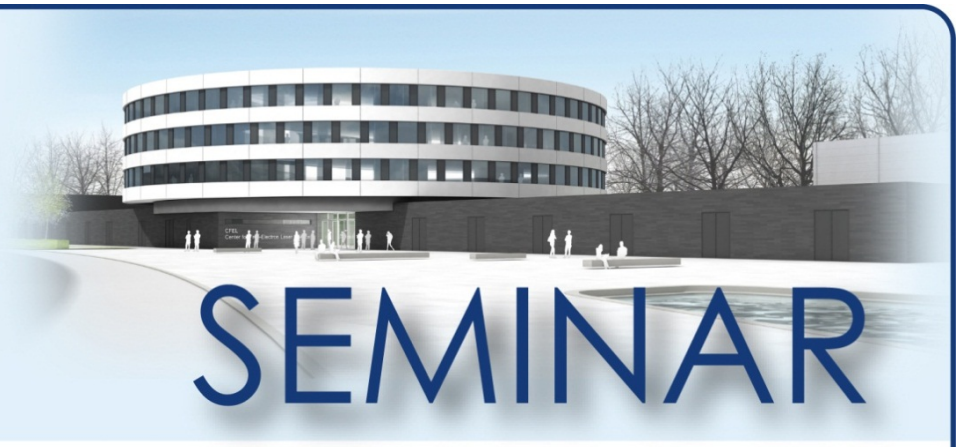
CFEL SCIENCE



SEMINAR

3rd April 2024 - 2:00 p.m.

CFEL-bldg. 99, seminar room IV

Laura Budewig

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X-ray-induced atomic transitions via machine learning

Considering individual quantum states during x-ray-induced ionization dynamics of atoms provides more precise information than the common configuration-based approach. However, in such a state-resolved approach, extremely huge-sized rate-equation calculations are inevitable. With machine learning nowadays being a thriving field, it is natural to ask whether this challenge of high computational effort might be addressed by applying a suitable machine-learning strategy. In this talk, I will present a strategy that embeds machine-learning models for predicting atomic transition parameters into state-resolved ionization dynamics calculations [1]. As machine-learning models, both feedforward neural networks and random forest regressors will be explored. Employing atomic argon, I will demonstrate that the proposed machine-learning strategy works in principle, but will also discuss its limitations.

[1] L. Budewig *et al.*, *Phys. Rev. Res.* **6**, 013265 (2024).

Host: Robin Santra – CFEL-DESY Theory Division