MATTER AND TECHNOLOGIES

Contribution ID: **77** Type: **not specified**

Machine Learning-based inverse problem solving for COXINEL Beamline

Recent advancements in free electron lasing at UV wavelengths have been been demonstrated using the COXINEL beamline driven by HZDR plasma accelerator in a seeded configuration. To optimize FEL radiation, it is crucial to address the complex, multivariate parameters involved in laser-plasma acceleration, electron beam transport, and radiation generation. These challenges can be understood by solving an ill-posed inverse problem in finding matching parameters of the simulation to reproduce the experiments. Machine learning-based methods offer potential solutions by accelerating theoretical understanding, enabling design space exploration, and providing reliable in-situ analysis of experimental data. In our previous work, we employed manual feature extraction methods that proved effective but would require domain expertise. Currently, we are focused on developing automated feature extraction techniques employing deep representation learning to extract input-domain features. This approach enhances adaptability, allowing the models to be applied to similar problems, such as those encountered in COXINEL, without the need for manual, domain-specific feature extraction.

Speed talk:

Normal speed talk selection

Primary authors: CHECKERVARTY, Ankush (Helmholtz-Zentrum Dresden-Rossendorf); WILLMANN, Anna; Dr GHAITH, Amin (Helmholtz-Zentrum Dresden-Rossendorf); CHANG, Yen-Yu (Helmholtz Zentrum Dresden Rossendorf); COUPRIE, Marie Emmanuelle; Dr LABERGE, Maxwell (Helmholtz-Zentrum Dresden-Rossendorf); AGUILAR, Ritz Ann (Helmholtz-Zentrum Dresden-Rossendorf (HZDR)); SCHRAMM, Ulrich (HZDR); Mr UFER, Patrick (Helmholtz-Zentrum Dresden-Rossendorf); Dr LABAT, Marie (Synchrotron SOLEIL, Saint-Aubin, France); BUSSMANN, Michael (CASUS / Helmholtz-Zentrum Dresden - Rossendorf); IRMAN, Arie (HZDR); KELLING, Jeffrey (HZDR)

Presenter: CHECKERVARTY, Ankush (Helmholtz-Zentrum Dresden-Rossendorf)

Session Classification: Poster