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Predicting XFEL performance using neural networks with physics constraints

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Predicting X-ray Free Electron Laser (XFEL) performance using Genesis simulation code is standard approach in designing future XFELs. Running this code is time consuming that slows down exploration of the parameter space during the design stage. Thus, using surrogate models based on machine learning techniques is often employed. These models however do not know about physics behind the simulations and make predictions that violate physics constraints. This contribution reports on training neural networks constraint by physics that predict XFEL performance and could be used as surrogate models for XFEL designs.

Footnotes

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