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## Utilizing neural networks to speed up coherent synchrotron radiation computations

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Coherent synchrotron radiation has a significant impact on electron storage rings and bunch compressors, inducing energy spread and emittance growth in a bunch. While the physics of the phenomenon is well-understood, numerical calculations are computationally expensive, severely limiting their usage. Here, we explore utilizing neural networks (NNs) to model the 3D wakefields of electrons in circular orbit in the steady state condition. We demonstrate that NNs can achieve a significant speed-up, while also accurately reproducing the 3D wakefields. NN models were developed for both Gaussian and general bunch distributions. These models can potentially aid in the design and optimization of accelerator apparatuses by enabling rapid searches through parameter space.

### Footnotes

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**Primary author:** LEON, Christopher (Los Alamos National Laboratory)

**Co-authors:** SCHEINKER, Alexander (Los Alamos National Laboratory); YAMPOLSKY, Nikolai (Los Alamos National Laboratory); ANISIMOV, Petr (Los Alamos National Laboratory)

**Presenter:** LEON, Christopher (Los Alamos National Laboratory)

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