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Synchrotron radiation simulations for the development of a coherent synchrotron radiation bunch length monitor

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High resolution bunch length monitors are an important diagnostic for the optimisation of any accelerator, from typical linacs or storage rings to novel acceleration systems. Given the availability of synchrotron radiation (SR) in these systems, studies have been carried out into how the spatial profile of the radiation changes with bunch length. Understanding these profile variations offers a non-invasive method of studying bunch profile characteristics. This contribution presents coherent SR simulations carried out in Synchrotron Radiation Workshop (SRW) for bunch lengths less than 100 fs, which are of interest to free electron lasers and novel acceleration facilities. These simulations have been carried out for the short pulse facility (SPF) situated in MAX IV. This is the location of a previously developed coherent transition radiation (CTR) monitor, which is currently being utilised as a compression monitor. The results of these simulations will be used to train a machine learning model to predict bunch profile characteristics, following the application of this process with the CTR monitor.

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Footnotes

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