Contribution ID: **18** Type: **not specified**

CSR suppression in the FCC-ee injector bunch compressor

Thursday 12 April 2018 09:10 (15 minutes)

Coherent Synchrotron Radiation (CSR) encountered in the FCC-ee injector bunch compressor can lead to transverse emittance dilution, undoing some of emittance reduction from the damping ring. The bunch compressor is required to reduce the RMS bunch length from 5 mm to 0.5 mm, prior to injection into the linac. This is achieved through a dogleg comprised of two triple-bend achromats (TBA) tailored to accomplish this compression. Despite the fact that the final bunch length is relatively long (compared to FEL linacs for example, where CSR is a commonly encountered problem), CSR is still capable of increasing the transverse emittance by 30% if left unchecked. This is due to the large R56 required, resulting in strong bending, and considerable CSR effect. Methods for suppressing the CSR-induced emittance growth through cancelling of the CSR kicks have already been demonstrated in the FEL community. In this paper we present a modification to this analysis, taking into account the variation of the CSR kick strength along the length of the bunch. The non-zero transverse dispersion at the centre dipole of each TBA leads to a distorted CSR kick, that can only be cancelled through correct choice of phase advance and correct division of compression between the two TBAs. Using this modified CSR-kick cancellation approach, the CSR-induced emittance growth can be significantly reduced.

Author: CHARLES, Tessa (University of Melbourne (AU))

Co-authors: BOLAND, Mark James (Australian Synchrotron (AU)); OIDE, Katsunobu; ZIMMERMANN, Frank (CERN)

Presenter: CHARLES, Tessa (University of Melbourne (AU))

Session Classification: FCC-ee injector

Track Classification: FCC-ee INJ