



Contribution ID: 2441 Contribution code: MOPL108

Type: **Poster Presentation**

Study of a bunch train total energy spread in a Linac using SLED

Monday, 8 May 2023 16:30 (2 hours)

A SLED (SLac Energy Doubler) RF pulse compressor is a passive RF component which increases the peak RF power level at the cost of reducing the pulse length. The Canadian Light Source (CLS) plans to replace the current 250 MeV Linac with a new one in mid-2024 by RI Research Instruments GmbH. The new Linac has a similar energy and two of its three 5.3 m TW constant-gradient accelerating structures are connecting to a SLED. Since a SLED output is not flat, this introduces additional energy variation along a bunch train, increasing the total energy spread. In addition, the energy spread acceptance of the CLS booster ring is below 0.5% FWHM, and it is critical to minimize the SLED non-flatness output effect by different methods. This paper will study the SLED effect on a multi-bunch train energy variation and consider the transient beam loading effect. Finally, we will show that by selecting proper RF phase switching and beam injection timing, and by alternating energy gain slope between the SLED-ed and non-SLED-ed Linac cavities can achieve the required energy spread.

Funding Agency

Footnotes

I have read and accept the Privacy Policy Statement

Yes

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Session Classification: Monday Poster Session

Track Classification: MC1: Colliders and other Particle Physics Accelerators: MC1.A08: Linear Accelerators