Contribution ID: **12** Type: **not specified**

Challenges of the beam diagnostic system at cSTART

Tuesday, June 16, 2020 11:50 AM (40 minutes)

In the cSTART project, KIT (Karlsruhe Institute for Technology) will build a very large acceptance compact storage ring (VLA-cSR) aiming to demonstrate and examine the injection and the storage of a laser wakefield accelerated (LWFA) beam. As for the first operation phase, FLUTE (Ferninfrarot Linac- und Test-Experiment) will be used as an injector to the storage ring delivering an electron beam at 50 MeV energy. A design of the storage ring has been under development with a DBA-FDF lattice having the optical elements very close to each other, making insertion of beam diagnostics very challenging. Given the small ring circumference of 44 m, the revolution frequency of single electron bunches and the repetition rates of its diagnostics are very high in the order of 6.8 MHz, which require very fast electronics. Moreover, to be able to measure signals from bunch currents ranging between 20 pC to 1 nC, very sensitive beam diagnostics and with high dynamic range are required. Meanwhile, ideas of a preliminary beam diagnostic system are being considered and discussed. In this presentation, we will report on these ideas and appreciate suggestions and comments from the community present.

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Track Classification: 5. Diagnostics: any other topics