Contribution ID: **63** Type: **not specified**

SP8: Longitudinal Diagnostics for Beam-Based Intra Bunch-Train Feedback

Thursday 14 July 2016 11:51 (3 minutes)

At today's free-electron lasers, the high-precision bunch-to-bunch regulation of longitudinal electron beam parameters, such as bunch arrival time and bunch compression, has become an increasingly more important factor for providing a stable and high quality photon beam to the users. At FLASH and the European XFEL a reliable and precise arrival time detection down to the femtosecond level has to cover a broad range of bunch charges, even within a bunch train. At both facilities, the new bunch arrival time monitors have to cope with the special operation mode where the MHz repetition rate bunch train is separated into several segments for different SASE beam lines, each with individual timing jitter characteristics. In this speed poster, we describe the recent developments for the improved bunch arrival time monitor systems currently being installed at both facilities. In parallel to the detector developments, computer simulations are needed for analysing and optimising the feedback regulation scheme.

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Session Classification: Session 1: Beam Diagnostics