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Pulse-to-pulse Diagnostics at High Reprate BERTRAM GREEN, SERGEY
KOVALEV, Helmholtz-Zentrum Dresden-Rossendorf, TORSTEN GOLZ, NIKOLA STOJANOVICH, DESY, ALAN FISHER, SLAC, TOBIAS KAMPFRATH, Fritz-Haber-Institut, MICHAEL GENSCH, Helmholtz-Zentrum Dresden-Rossendorf — Femtosecond level diagnostic and control of sub-picosecond electron bunches is an important topic in modern accelerator research. At the same time new linear electron accelerators based on quasi-CW SRF technology will be the drivers of many future 4th Generation lightsources such as X-ray free electron lasers. A high duty cycle, high stability and online pulse to pulse diagnostic at these new accelerators are crucial ingredients to the success of these large scale facilities. A novel THz based online monitor concept is presented that has the potential to give access to pulse to pulse information on bunch form, arrival time and energy at high repetition rate and down to sub pC charges. We furthermore show experimentally that pulse to pulse arrival time measurements can be used to perform pump-probe experiments with a temporal resolution in the few-fs regime and an exceptional dynamic range. Our scheme has been tested at the superradiant test facility TELBE, but can be readily transferred to other SRF accelerator driven photon sources, such as X-FELs.

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