

Time structure characterization of beams from proton and electron accelerators using Timepix3

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Semiconductor hybrid pixel detectors with Timepix3 chips developed by Medipix collaboration at CERN can simultaneously measure deposited energy and time of arrival of individual particle hits in all 256 x 256 pixels with 55 μm pitch size. Their nanosecond temporal resolution was exploited to perform characterization of the ultra-high dose-per-pulse electron beam from a linear accelerator with varying pulse lengths (few μs range), as well as the proton beam produced in a cyclotron with varying beam current. Since Timepix3 has single-particle detection sensitivity, the AdvAPIX TPX3 detector was positioned out-of-primary-beam, thus using the opportunity to study the primary beam by measuring induced secondary radiation. Investigated quantities included irradiation time, delivered dose rate, pulse count, pulse frequency, and beam stability. The results and methods can be utilized for both online and offline beam monitoring and characterization.

Alternate track

1. Accelerator: Physics, Performance, and R&D for Future Facilities

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