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Optical pulse picker system for bunch-by-bunch measurement in storage ring

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The non-uniformity and longitudinal oscillations in multiple-bunch filling, as well as space charge effects in an electron storage ring, can lead to significant deviations in the streak camera's measurements of bunch length. Selecting a single bunch for measurement can effectively improve the accuracy of bunch length measurements and the observation of rapid bunch oscillations. This paper introduces the construction of an optical pulse selection system using a Pockels cell based on RTP crystals. The system controls the RTP crystal using fast electronics and high-voltage electronics. By adjusting the drive voltage frequency and trigger delay of the high-voltage driver, precise selection of single pulses in a multi-bunch filling mode is achieved. Relevant experimental studies have been conducted. This system can effectively select specific bunches or bunch trains from multiple bunches, which is of significant importance for diagnosing the longitudinal characteristics and instabilities of the beam in an electron storage ring.

Footnotes

Funding Agency

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Yes

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