

Fast Beam Based Alignment Using AC Corrector Excitations

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Standard quadrupole beam-based alignment (BBA) techniques rely on orbit data and on the sequential variation of quadrupole and corrector magnets (CM). This results in time consuming measurements of the order of several hours. Fast (10 kHz) beam position monitors (BPM) and CMs with ac power supplies are routinely used in modern synchrotron light sources to drive fast orbit feedback systems. In this paper we show how they can be employed to reduce the time for the BBA to several minutes only, ensuring the same level of accuracy and precision. Moreover, conversely to the standard BBA, the new procedure accounts automatically for any level of betatron coupling, BPM roll and OCM tilt. In the case of the ALBA 3rd generation light source, the time for a complete measurement dropped from 5 hours to 10 minutes, a reduction by a factor 30. As further extension of this novel approach, an even faster skew quadrupole BBA was demonstrated in ALBA for the first time, taking advantage of the additional ac modulation of the skew quadrupole field. Results from this fully ac measurement are compared with those obtained via dc scan of the skew quadrupole.

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