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Automatic bunch targeting for single-bunch beam position monitors

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Single-bunch beam position monitors (BPM) are used to track the trajectory and measure turn-by-turn positions of a single bunch of electrons while multiple bunches are present in the storage ring. In the Advanced Photon Source Upgrade (APS-U), 20 single-bunch BPMs have been installed in the first three sections right after the injection point. For each BPMs, an RF switch is used to select the signal of the target bunch to the BPM electronics. The timing signals to the BPM electronics and the RF switch are provided by the Fast Event System at APS-U, a global event-based trigger distribution system based on the hardware components developed by Micro-research Finland (MRF). The requirement of the timing signal to the RF switch is stringent to reliably select the target bunch. The GTX output function of the MRF event receiver can fine-tune the delay of the output signal to achieve the desired timing resolution for the RF switches. In this presentation, the hardware configuration of the timing signals and the software developed for automatic bunch targeting are described. The performance of the system and example applications are also discussed.
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