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HEPS timing system

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The High Energy Photon Source (HEPS), a fourth-generation synchrotron light source developed by the Institute of High Energy Physics (IHEP), is currently in the commissioning phase. As a critical subsystem, the HEPS timing system generates and distributes synchronized triggers and clock signals to both the accelerator components and beamline instruments, coordinating the entire facility's operations. To accommodate the ultra-low emittance requirements, HEPS employs a novel on-axis swap-out injection scheme where the Booster serves as an accumulator ring. In this process, bunches from the Storage Ring are returned to the Booster, where they merge and accumulate with newly injected bunches before being reinjected into their original buckets in the Storage Ring. Furthermore, HEPS utilizes a synchronized step-by-step energy ramping system capable of pausing and stabilizing at any predefined energy level during accelerator operation. This paper will present the operational principles and system logic of the HEPS timing system, along with its architecture, hardware and software implementations.

Footnotes

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