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White Rabbit based picosecond timing system for scientific facilities

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The timing system is a critical element in scientific facilities such as particle accelerators or laser ignition installations. The different subsystems that integrate these scientific facilities need to have a common notion of time. This common time reference is provided by the timing system. Thanks to that, it is possible to operate the machine in a time coherent manner and to properly track the different events that occur during the operation of the machine. The timing system also provides the discrete triggering events and periodic signals requested for the different subsystems. Furthermore, it can be used also for radiofrequency distribution across the facility. In this work it is presented the timing system architecture, based on the White Rabbit technology and currently under development by Safran Electronic & Defense Spain SLU, for the distribution of synchronized triggers. The hardware, based on FPGA, will be detailed. The timing system allows total triggering configuration in terms of direction, number of pulses, pulse rate, pulse period and delay offering a resolution in the order of 5 ps. The White Rabbit technology provides sub-nanosecond accuracy and picosecond precision in addition to important characteristics such as automatic link calibration. The performance achieved will be shown in this work.

Footnotes

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