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P2.042 Development of the new timing system for the ISTTOK Tokamak

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The ISTTOK, a large aspect ratio fully ohmic tokamak operated at IPFN-IST is presently scientifically exploring an AC) regime, aiming to extend much longer pulses, up to one second plasma and around 40 current inversions.

The control of the earlier single-pulse plasma formation and sustaining was essentially deterministic using pre-programmed delays on a set of timing channels generated within an in-house developed VME board. Due to limited register space, in different scales time delays the time resolution had to be adjusted and/or several channels chained together which implied low flexibility and a non-straightforward operator interface. Meanwhile the first AC operation campaign showed that the current inversion phase is critical for the number of plasma semi-pulses that could be attained, which pushed the development of a new ATCA/MARTE based real-time control system, capable to monitor the plasma and generate the optimized power supplies and other actuator references in a 50 μ s control cycle. Following, also the timing and triggering system is now being upgraded with a dedicated custom hardware based on a high performing FPGA (Xilinx Kintex 7), which can be reconfigured on-the fly when receiving external events. In this contribution, we present the system architecture, main features, event transmission network, programming model, and some initial tests made in ISTTOK.

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