

Plasma density measurement in TJ-II Infrared interferometer - Advanced processor based on FPGA's

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This work presents the implementation of a novel processing system for measuring line average electronic density in the TJ-II stellarator diagnostic, Infra-Red Two-Colour Interferometer. Line average electronic density is proportional to phase difference between probing and reference signals coming from the interferometer, as the Appleton-Hartree relation states. The novelty of the approach is the development of a real time measuring system where research work has been carried out in two areas, a new interpolation algorithm and the implementation of a new specific processor on FPGA.

The main goal of this new system is to substitute the previous offline processing system, also to eliminate an intermediate mixing frequency stage (Now the output signals coming from the interferometer are directly sampled) and finally to generate a real time density signal for control purposes in TJ-II and in other diagnostics. This device is intended to be the new data acquisition-processing system for the future six channels infrared interferometer that requires at least fourteen inputs signals. The acquired expertise could be transferred to the W7-X stellarator and the ITER tokamak.

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