

## Recent Diagnostic Developments with the ASDEX Upgrade Standard Data Acquisition System using the FPGA implemented Serial I/O card „SIO2“

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ASDEX Upgrade (AUG) since many years is using a built to purpose FPGA based PCIe computer interface with fast serial interconnects to external DAQ (data acquisition) devices as in-house standard. The renewal of large physics measurement systems („diagnostics“) for the Mirnov probes, the Soft-X-Ray cameras and others have been successfully conducted as planned. These diagnostics have also undergone the transition from Solaris 5.11 to Linux CentOS-7 expanded by real-time kernel extensions. These diagnostics receiving the stream of measured samples from the SIO2 periphery via DMA (direct memory access) in real-time can directly provide data for plasma control via sharing the DMA memory with dedicated DCS APs (discharge control system application processes) running on the same node as part of the AUG distributed DCS (discharge control system).

The SIO DAQ concept is further applied to a Thomson-Scattering system located in the AUG Divertor („DTS“ Divertor Thomson-Scattering). New 1 GigaSample ADCs developed for this diagnostic expand the range of measuring periphery into the GHz time resolution range. The same ADCs are planned to be used to refurbish and real-time enable the main chamber Thomson-Scattering systems as desired by AUG plasma control.

The talk will describe briefly some specifics of the diagnostics mentioned above. It will further emphasize on modifications of the SIO2 FPGA features introduced to address these specifics and it will give a short description of the main features of the developed GigaSample ADCs.

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