Front end electronics and FPGA development

Patrick Gessler

Joint Electronics Group
Detector Developments (WP75) + Data Acquisition and Control (WP76)
European XFEL GmbH

The terms “detector” or “diagnostic station” as commonly used at photon based research facilities, does not only refer to the actual sensor material, but includes many additional components, which are usually organized in a layered way. Those layers depend on the actual type of detector, but typical examples are: charge sensitive amplifiers, which are collecting charges produced in the detecting material, signal-shaping front-end electronics, analog-to-digital converters (ADCs, digitizers), memories for short term storage, FPGAs for online processing, high-speed communication channels and interfaces, computers and hard-drive storage.

This talk will provide an overview of the hardware used for digitizing and online processing of detector and diagnostic related signals. It will focus on the front-end electronic required in order to interface such signals with the digitizer inputs, trigger and synchronization related issues as well as the developments on the FPGA framework used for modular online processing algorithms and its software interfacing.