



Elektrotechnisches Kolloquium

der Bergischen Universität Wuppertal

Die Fakultät für Elektrotechnik, Informationstechnik und Medientechnik lädt zur Teilnahme an folgender Vortragsveranstaltung mit anschließender Diskussion ein:

Es spricht: Dominic Ecker

Lehrstuhl für Automatisierungstechnik/Informatik
Prof. Dr.-Ing Dietmar Tutsch

über das Thema: A Highly Scalable Control Interface for the ATLAS Detector Control System at the High-Luminosity LHC

Inhalt:

The Detector Control System (DCS) ensures the safe and coherent operation of the ATLAS detector and its technical infrastructure by providing a standardized, homogenous yet flexible interface. The DCS enables the control, monitoring, and archiving of operational parameters at any time through this interface. With the planned upgrade of the LHC to the High-Luminosity LHC, particle collision rates and thus radiation levels will increase significantly. This, in conjunction with the integration of novel detector technologies, poses significant challenges for the DCS, which must cope with a more demanding radiation environment and the requirements of new detector systems for a high-performance, scalable DCS interface.

To address these challenges, the EMCI-EMP DCS interface was developed. The complementary system is based on two custom hardware platforms: The Embedded Monitoring and Control Interface (EMCI) is a radiation-tolerant Front-End module, and the Embedded Monitoring Processor (EMP) is an MPSoC-based Back-End that can connect to up to twelve EMCIs via high-speed optical links and connects to the distributed SCADA system via LAN. To complement the hardware, a modular firmware and software ecosystem has been developed, enabling the rapid adoption of the system to new on-detector technologies. The ecosystem features generic components, including a runtime environment for the EMP, hardware access layers for EMP and EMCI control, a firmware reference project, and a custom-developed Slow-Control Direct Memory Access subsystem.

The development of the EMCI-EMP system represents a substantial enhancement to the ATLAS DCS, addressing critical challenges posed by the HL-LHC environment. The system's integration of radiation-tolerant Front-End devices and a flexible Back-End SoC platform ensures reliable control and monitoring of on-detector components. Extensive testing has confirmed the system's performance and robustness, thereby validating the EMCI-EMP interface as a scalable solution for maintaining the detector's operational integrity throughout the HL-LHC's lifespan.

Termin: 14.01.2026, 14 Uhr

Ort: Bergische Universität Wuppertal
Campus Freudenberg, Seminarraum FG 1.01