

Academia-Industry Matching Event on the Mutual Impact of Industry 4.0 and High-Energy Physics

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The detector control systems of large experiments at the LHC accelerator at CERN

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Abstract:

The control systems of large experiments at CERN are based on SCADA systems and use commercial components. The deployed technologies and their implementation share the design principles with Industry 4.0. This talk will demonstrate these commonalities using the ALICE experiment as an example.

The ALICE experiment studies the characteristics of primordial matter under the conditions that existed only a fraction of second after the Big Bang. Elementary particles created in the collisions of Pb nuclei at the LHC are captured by a detector, weighting 11000 tons. A wide range of different detecting technologies has been deployed to allow for measurement of particle trajectories, type and momentum. A distributed system based on Siemens WINCC OA is responsible for safe and uninterrupted operation of this experiment. It is in charge of about one million supervised parameters. In this talk we describe the control system architecture, its components, hierarchical organization and the data flow.

In 2019 ALICE will undergo an upgrade. The control system will provide data for the ALICE O2 data processing facility. Compared to present requirements, the DCS will increase its data flow by a factor of 5000. About 100 000 condition parameters need to be provided to O2 each 50ms. In this talk we will explain how the detector control system will handle this amount of data.

About the speaker:

Peter Chochula has been working at CERN since 1997 where he specialized on research and development of silicon detectors for high energy physics experiments. Currently he works for control system of ALICE experiment as a deputy project leader, responsible for the overall system architecture. He supervises new developments assuring system compatibility with new ALICE data collection strategy after 2018. Peter graduated from the Comenius University in Slovakia and holds the PhD. degree in nuclear physics. Before joining CERN, he was employed by the Comenius University where he obtained an associate professor (docent) degree in the field of experimental nuclear physics.

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