HK 55: Invited Talks V

Time: Thursday 11:00–12:30 Location: HK-H1

Invited Talk HK 55.1 Thu 11:00 HK-H1
Online data processing with GPUs in ALICE during LHC Run 3 — •David Rohr for the ALICE-Collaboration — CERN, Geneva, Switzerland

The ALICE experiment has undergone a major upgrade for LHC Run 3 and will record 50 times more heavy ion collisions than before. The new computing scheme for Run 3 replaces the traditionally separate online and offline frameworks by a unified one. Processing will happen in two phases. During data taking, a synchronous processing phase performs data compression, calibration, and quality control on the online computing farm. The output is stored on an on-site disk buffer. When there is no beam in the LHC, the same computing farm is used for the asynchronous reprocessing of the data which yields the final reconstruction output. ALICE will employ neither hardware nor software triggers for Pb-Pb data taking but instead store all collisions in compressed form. This requires full online processing of all recorded data, which is a major change compared to a traditional online systems, which sees only the data selected by a hardware trigger. To cope with the increased data rate and computing requirement, ALICE employs graphics cards (GPUs) as the backbone of the online processing. In order to make full use of the online farm also for asynchronous reconstruction, also a large fraction of the asynchronous phase is being designed to run on GPUs. The talk will detail the ALICE Run 3 computing scheme, and outline the hardware architecture and software design for synchronous and asynchronous processing.

Invited Talk HK 55.2 Thu 11:30 HK-H1
From outer space to deep inside: nuclear physics prospects at MAMI and MESA — •Michaela Thiel — Institut für Kernphysik, JGU Mainz

The Equation of State (EoS) links together fundamental properties of nuclear matter. Heavy nuclei, though orders of magnitude smaller than neutron stars, are governed by the same underlying physics, which is enshrined in the EoS. An accurate and model-independent determination of the neutron-skin thickness of heavy nuclei, using parity-violating electron scattering, will provide significant constraints on the density dependence of the nuclear symmetry energy, a key parameter of the EoS. Within the scope of the P2 experimental setup at MESA, the Mainz Radius EXperiment (MREX) will determine the neutron-skin thickness of ^{208}Pb with ultimate precision. For the interpretation of this and future parity-violation measurements at the precision frontier, theoretical predictions with uncertainties below those of the experiments are required. To that end it is mandatory to go beyond the one-photon exchange approximation and include higher-order corrections. Corresponding measurements of the beam-normal single spin asymmetry A_n, an observable sensitive to two-photon exchange processes, are essential to benchmark such calculations. A comprehensive systematic study of the Q^2 and Z dependence of A_n in the mass regime ^{12}C to ^{90}Zr at MAMI, using the A1 spectrometer setup, has laid an excellent foundation for the near-future parity-violation measurement program at MESA. Status and prospects of the projects will be presented. (Talk will be given on behalf of the A1 and P2 collaborations)

Invited Talk HK 55.3 Thu 12:00 HK-H1
CMOS Monolithic Active Pixel Sensors — •Michael Deveaux — GSI Darmstadt

Being pioneered by the IPHC Strasbourg, CMOS Monolithic Active Pixel Sensors for charged particle tracking feature an attractive combination of highest detection efficiency, spatial precision ($\sim 5\ \mu$m) and low power dissipation. The 50 μm thin sensors may be combined with ultra-light support structures and cooling systems. Thanks to progress in CMOS industry and the joined efforts of the community, their rate capability and radiation tolerance were improved by several orders of magnitude during the past 20 years. The maturity reached nowadays allows to use the sensors in multiple applications requiring highest tracking precision in combination with advanced rate capability and time resolution. This includes state-of-the-art tracking and vertex detectors as known from STAR, ALICE, the future CBM experiment and possibly future charm and Higgs factories.

The contribution summarizes the features, capabilities and remaining limitations of the technology and gives a brief insight into current R&D activities within and beyond the hadron physics community.