

Plenary Talk PV IX Fri 11:00 HS1
Trigger Challenges of Future Experiments — ●IVAN KISEL —
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Fast online data analysis and selection (triggering) is one of the challenging problems of the data analysis in modern and future high-energy physics experiments. This is especially important for heavy-ion experiments like ALICE (CERN, Switzerland) and CBM (FAIR/GSI, Germany) with thousands of particles produced in a collision (so-called event). The finding of particle trajectories (tracks) among huge amount of measurements is the most time consuming stage of the event reconstruction. Thus, every track finder has to solve a very complicated combinatorial optimization problem. The benefit of the cellular automaton (CA) method consists in building up short track segments

already before the beginning of the combinatorial search. The CA method is intrinsically local and parallel. Because of the high particle track densities, the CA track finder includes the Kalman filter (KF) algorithm for the track parameters estimation. Online event selection involves in addition reconstruction of the full event topology with particular consideration of short leaved particles with interesting physics. Future many-core CPU and GPU architectures require a fundamental redesign of the traditional approaches to data processing. A massive hardware parallelization at the level of cores, threads and vectors should be adequately reflected in a mathematical and programming optimization of the algorithms. Therefore, in collaboration with Intel the reconstruction algorithms are mathematically and numerically optimized with respect to the future computer systems.