HK 1: Invited Talks

Time: Monday 14:45–15:45 Location: MED 00.915

Invited Talk HK 1.1 Mon 14:45 MED 00.915

ALICE Run 3 Physics Highlights — •Igor Altsybeev for the ALICE Germany-Collaboration — Technische Universität München, Garching bei München, Germany

The ALICE experiment at the LHC is designed to study the properties of the quark-gluon plasma (QGP) formed in relativistic heavy-ion collisions. The QGP is a hot, dense state of QCD matter in which quarks and gluons are no longer confined within hadrons and can propagate over distances larger than the hadronic scale.

During Run 3 of the LHC (2022–2026), ALICE has collected data across a variety of collision systems, including pp, Pb-Pb, as well as – for the first time – light-ion systems such as pO, OO and Ne-Ne. Compared to Runs 1 and 2, the experiment operates at significantly higher interaction rates, made possible by major detector upgrades that enable continuous readout rather than a trigger-based data acquisition.

In this talk, an overview of recent physics results from ALICE will be presented, with a particular emphasis on the high-statistics data collected during Run 3.

Invited Talk HK 1.2 Mon 15:15 MED 00.915

Ab initio studies on muon capture and rare decays — •Lotta Jokiniemi — Technische Universität Darmstadt, Darmstadt, Germany — ExtreMe Matter Institute EMMI, Darmstadt, Germany

Neutrinoless double-beta decay, in which a nucleus decays by two simultaneous beta decays without emitting neutrinos, is a sensitive probe for new physics. The decay would be the first signal of lepton number violation, since only two beta particles without antiparticles are created. It would also prove that neutrinos have Majorana nature and shed light on their unknown masses. However, interpreting the experiments requires reliable nuclear-theory predictions.

Muon capture is a nuclear-weak process in which a negatively charged muon, initially in an atomic bound state, is captured by the atomic nucleus, resulting in atomic number reduction by one and emission of a muon neutrino. Thanks to the high momentum transfer involved in the process, it can be used to probe the weak currents at the momentum regime relevant for the neutrinoless double-beta decay.

I will discuss recent advances in the theory predictions for neutrinoless double-beta decay. Then, I will talk about ab initio studies on muon capture in light nuclei, focusing in particular on the ab initio no-core shell model. These systematically improvable calculations are based on nuclear interactions derived from chiral effective field theory. The computed rates are found to be in good agreement with available experimental counterparts, motivating future experimental and theoretical explorations in light nuclei.

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