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Unraveling the properties of strongly interacting matter with the ALICE experiment at the LHC

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Colliding heavy nuclei at a speed approaching that of light allows QCD matter to be investigated in the Quark-Gluon-Plasma (QGP) state that existed microseconds after the Big Bang. Numerous competing physics processes that influence the final detected particles require a vast amount of data and diverse measurements to unravel the properties of strongly interacting matter in this regime of high temperatures and densities. The ALICE experiment at the Large Hadron Collider (LHC) has been specifically designed to study the QCD matter in the QGP state. With this aim, ALICE has measured a wide range of particles and different observables, and has collected data from Pb-Pb, Xe-Xe, p-Pb and pp collisions at multi-TeV center-of-mass energies. The ALICE experiment is currently running since 2022 in the LHC Run 3, taking advantage of increased readout rates and improved vertex resolution that have been achieved thanks to the upgrades implemented during the Long Shutdown 2 (LS 2). A major upgrade will follow during LS 3 and a complete redesign of the detector will be implemented after the High-Luminosity LHC Run 4. A summary overview of recent ALICE experimental physics results will be discussed together with the plans for Run 4, scheduled to begin in 2030.

Abstract Category

Nuclear Physics

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