



Münchner Physik- Kolloquium

at home!
Winter
2021/22

ALICE at the LHC: a unique laboratory to study the quark-gluon plasma and exotic states in nuclear physics

Dr. Alexander Kalweit, *CERN, Geneva, Switzerland*

Monday, 17 January 2022, 17:15 h

<https://tum-conf.zoom.us/j/93234766313> Meeting-ID: 932 3476 6313 Password: Kolloquium

Please install the software in advance.

The ALICE experiment was originally designed to study the quark-gluon-plasma, a new state of matter in which quarks and gluons are not confined into hadrons. The extreme temperatures ($> 1.8 \times 10^{12}$ K) needed for its creation were present in the early universe for about $10_{\mu\text{s}}$ after the big bang. Today, they can be reached for about 10^{-23} s in ultra-relativistic collisions of Pb-ions at the Large Hadron Collider. Since the first heavy-ion data taking in 2010, ALICE has obtained a wealth of experimental data that sheds light on the properties of this hot, strongly-interacting matter and a selected set of highlight results will be presented in my talk.

More recently, the versatility of both the Large Hadron Collider and the ALICE apparatus have given access to a unique set of nuclear and hadronic physics measurements. In this context, the formation and properties of light antinuclei and hypernuclei have been extensively studied. In addition, precision measurements on hadron-hadron correlations have provided fundamental insights into hyperon-nucleon and hyperon-hyperon interactions. The main results from this new and dynamic research area will be presented. The application of these findings to astrophysical challenges, ranging from the equation of state of neutron stars to the search for dark matter in space, will be discussed.