

# QCD matter physics at the future FAIR facility in Germany

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## Abstract

The Compressed Baryonic Matter (CBM) experiment will be one of the major scientific pillars of the future Facility for Antiproton and Ion Research (FAIR) in Darmstadt. The goal of the CBM research program is to explore the QCD phase diagram in the region of high baryon densities using high-energy nucleus-nucleus collisions. This includes the study of the equation-of-state of nuclear matter at neutron star core densities, and the search for the deconfinement and chiral phase transitions. The CBM detector is designed to measure rare diagnostic probes such as hadrons including multi-strange (anti-) hyperons, lepton pairs, and charmed particles with unprecedented precision and statistics. Most of these particles will be studied for the first time in the FAIR energy range. In order to achieve the required precision, the measurements will be performed at very high reaction rates of 1 to 10 MHz. This requires very fast and radiation-hard detectors, a novel data read-out and analysis concept based on free streaming front-end electronics, and a high-performance computing cluster for online event selection. The status of FAIR and the physics program of the proposed CBM experiment will be discussed.

## Preferred Track

Future Experimental Facilities, Upgrades, and Instrumentation

## Collaboration

Other

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