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Typ: Talk

## New opportunities for understanding high-density QCD matter with CMS Phase II detector at the High-Luminosity LHC era

*Dienstag, 28. März 2023 14:00 (20 Minuten)*

The intriguing phenomena emerging in the high-density QCD matter are being widely studied in the heavy ion program at the LHC and will be understood more deeply during the high luminosity LHC (HL-LHC) era. The CMS experiment is under the Phase II upgrade towards the HL-LHC era. A new timing detector is proposed with timing resolution for minimum ionization particles (MIP) to be 30ps. The MIP timing detector (MTD) will provide the particle identification (PID) ability with a large acceptance covering up to  $\eta < 3$  through time-of-flight (TOF). Combining MTD with the other new sub-detectors, a tracker with acceptance  $\eta < 4$ , high granularity calorimeters with acceptance covering  $\eta < 5$ , will enable the deep studies of high-density QCD matters in ultra-relativistic heavy ion collisions. In this presentation, the performances of a broad range of measurements in heavy ion programs will be discussed using TOF-PID. These include the (3+1)D evolution of heavy flavor quarks, QGP medium response to high- $p_T$  parton energy loss at wide jet cone angles, collectivity in small systems, fluctuations and transport of initially conserved charges, and light nuclei physics.

### Experiment/Theory

CMS

### Affiliation

CMS

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**Sitzung Einordnung:** Parallel: Future Experimental Facilities

**Track Klassifizierung:** Future experimental facilities