Abstract Submitted
for the DNP20 Meeting of
The American Physical Society

**New opportunities in heavy ion physics at HL-LHC with a MIP Timing Detector at the CMS experiment**[1] ANDRE STAHL, Rice University, COMPACT MUON SOLENOID COLLABORATION[2] — The Compact Muon Solenoid (CMS) detector at the CERN Large Hadron Collider (LHC) is undergoing an extensive Phase II upgrade program to prepare for the challenging conditions of the High-Luminosity LHC (HL-LHC). A new timing layer is designed to measure minimum ionizing particles (MIPs) with a hermetic coverage up to a pseudo-rapidity of $|\eta|$=3. This MIP Timing Detector (MTD) will comprise a central barrel section based on LYSO:Ce crystals read out with SiPMs and two end-cap discs instrumented with radiation-tolerant Low Gain Avalanche Detectors (LGADs), reaching a time resolution of  30 ps. The precision time information from the MTD will serve as an excellent time-of-flight detector for particle identification in QCD and heavy-ion physics. Together with the wide coverage of tracker and calorimetry, the MTD will enable a broad range of new and unique opportunities in heavy-ion physics at CMS. We present the current status and ongoing RD of the MTD and performance of extending heavy-ion physics program at CMS with particle identification, as well as possible applications of LGAD technology for timing measurements for the future Electron Ion Collider.

[1]Andre Stahl is supported by the US Department of Energy, Office of Nuclear Physics (grant DE-SC0005131)
[2]Compact Muon Solenoid experiment at CERN

Andre Stahl
Rice University

Date submitted: 26 Jun 2020 Electronic form version 1.4