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Prospects for the study of the hot QCD matter with heavy-flavor probes at ALICE-3 (HL-LHC)

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ALICE-3 is being designed as a next-generation heavy-ion experiment to be operated at high-luminosity Large Hadron Collider (HL-LHC) at CERN after 2030. With a factor of fifty higher luminosity, the ALICE-3 will be able to study properties of quark-gluon matter with the probes, which were previously unavailable due to small cross-sections, high background levels, and insufficient sensitivity of detectors. In particular, properties of the hot and dense QCD matter will be studied by measuring production cross sections and nuclear modification factors for open charm hadrons to determine the energy losses by heavy flavor quarks traversing a hot quark-gluon matter.

In this contribution, we present results of the feasibility studies for the measurements of rarely produced ground and excited states of open charm ($D0$, $D(2007)$, $D(2010)$) in the ALICE-3 experimental setup and formulate the main requirements for the detector subsystems to ensure reliable signal extraction in a wide rapidity and transverse momentum ranges.

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