

Title: Electroweak bosons as probes of quark-gluon plasma

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Abstract: This thesis is focused on heavy-ion physics which aims to improve our understanding of the strong interaction as well as of the quark-gluon plasma. Such an exotic state of matter exists only in the extreme conditions which could be achieved in the lead-lead collisions in the LHC at CERN. Hence we will discuss the physics of accelerators and detectors. We will outline the structure and properties of the ATLAS experiment, one of the detectors on the LHC. Later, we aimed at the physics behind the heavy-ion collisions. We describe what the quark-gluon plasma is and how we can use electroweak bosons to probe it. Basic of our analysis procedures will be introduced, as well as the principles of simulation of data with the Pythia8 model. The main goal of this work is to study the re-clustering of the jets and how that changes their properties. Then we focused on the properties of the electroweak bosons and how they could help us with the study of the quark-gluon plasma. In the end, we estimate the number of events that could be expected to observe in future measurements on ATLAS in heavy-ion collisions.

Keywords: ATLAS, quark-gluon plasma, electroweak bosons, jet, jet quenching