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## Posudek školitele k disertační práci ing. Artema Isakova na téma Inclusive production of b jets in collisions of p-Pb and pp in ALICE

The thesis of Artem Isakov can be divided into two parts. The first part deals with his analysis of inclusive jets associated with b-quark fragmentation measured by the ALICE experiment in p-Pb and pp collisions at  $\sqrt{s_{NN}} = 5.02$  TeV. The second part then focuses on his contribution to the Quality Control software development for the new ALICE Inner Tracking System. At the beginning Artem introduces some important concepts which are important for his analysis such as jets, factorization theorem, QCD phase diagram, etc. In this context he discusses the open question why particles emerging from collisions with a small number of participant nucleons exhibit some signatures that can be attributed to emergence of quark-gluon-plasma initial state. Such initial state would imply that produced hadrons and jets should be affected by jet quenching. This provides the motivation to measure b jets in p-Pb, where one can search for possible modification of the jet  $p_T$  spectra by cold-nuclear-matter and hot-nuclear-matter mass-dependent effects.

The thesis describes how the student selected b jet candidates by tagging secondary decay vertices from b-hadron decays, how the raw  $p_T$  of selected b jet candidates were corrected for tagging efficiency and purity, and how the resulting spectra were unfolded to correct for momentum smearing due to instrumental and other effects. The main results of the thesis are the  $p_T$  differential b jet cross sections in pp and p-Pb, the corresponding nuclear modification factor, and fractions of b jets among inclusive untagged jets. The results of the analysis were found to be in good agreement with another analysis which used a different method for b-jet tagging. The results of both analyzes were combined and were published in the **JHEP 01** (2022) 178 paper published by the ALICE collaboration, where Artem Isakov was one of the principal authors. The obtained results extend the previous measurements of b jets done at the LHC down to jet  $p_T \sim 10$  GeV/c, where one can expect to gain better sensitivity to mass dependent effects. The presented nuclear modification factor is within the quoted uncertainties compatible with unity, which tells us that the possible influence of cold nuclear matter and jet quenching effects has to be smaller than the precision of the current measurement.

During his Ph.D. study, Artem Isakov has also made many important contributions to the ALICE Inner Tracking System upgrade. He participated in related test beam campaigns, he took part in commissioning of the detector, he worked on simulation benchmarks, and his key contribution was related to the ITS Quality Control software development. This work is discussed in the second part of his thesis, where he also shows how the QC software evaluated performance of the new ITS using the first data of the LHC Run 3. Let me highlight that the work of Artem Isakov is highly appreciated by the ITS project leaders. In the second half of 2022 and in 2023, he became the ITS Data quality coordinator.

To summarize, the thesis brings new original results and clearly states what was done by the author and which material he took from other sources. Artem has presented his work at several international conferences and the analysis was published in a peer-reviewed journal. He has proven that he is able to work independently. Hence, I recommend the thesis for the defense.

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