

Posudek školitele na doktorskou disertační práci

Doctorand:

David Horák

Title of dissertation:

Measurement of ρ^0 photoproduction at high energies with the ALICE detector

Supervisor:

prof. Jesús Guillermo Contreras Nuño, Ph. D.

Supervisor specialist:

Mgr. Michal Broz, Ph.D.

Recommendation:

The work fulfils all the requirements to be presented as a doctoral thesis

This work includes two important results in the field of diffractive vector meson photoproduction, which is a window to study the energy evolution of nuclear structure in terms of QCD. David performed the first measurement of this process accompanied of electromagnetic dissociation. This is the first step to access the Bjorken-x evolution of the gluon component of Pb at forward rapidities. In addition to this important result, David also measured, for the first time, the photoproduction ρ^0 mesons off xenon targets. This allowed David to study the atomic-mass-number dependence of the process at a fixed energy in the photon-nucleus centre-of-mass system. The comparison of this measurement with theoretical predictions show a strong shadowing, and that the cross section does not yet reach the black-disc limit of QCD.

The dissertation is structured as follows: a preface, five chapters, and three appendices; complemented, as customary, by tables of content, figures, tables and the bibliography. The first chapter has an in-depth introduction to the LHC and the ALICE detector, including a section on the processing of data from the collisions themselves to the analysis stage. The second chapter presents an introduction to the theoretical ideas behind the measurement, including a description of ultra-peripheral collisions and a discussion of each of the models that are later on compared to data. Chapter 3 gives an overview of previous measurements as well as the models to describe the shape of the ρ^0 invariant distribution. Finally, Chapter 4 presents the results in detail, while Chapter 5 briefly presents the conclusions and outlook for future work.

The student developed by himself all the tools needed to obtain the results presented in the dissertation. He was involved in the technical aspects as well as in the physics discussions. He headed the teams that wrote and pushed through the collaboration the papers with the result mentioned above. He also took care of the interaction with the referees assigned by the journals.

In summary, the work of the student is of excellent quality in all fronts: technical, analysis, physics. The main results attest to his creativity and capability of

impacting the development of the field. The work easily fulfils all the requirements to be presented as a doctoral thesis

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