Evaluation of the candidate's dissertation

Riccardo Russo (University of Torino)
Measurement of D+ meson production in p-Pb collisions with the ALICE detector

The dissertation is devoted to experimental study of charm production in p-Pb collisions at LHC. It focus on reconstruction of D+ mesons, determination of nuclear modification factor, evaluation of B feeddown contribution and study of charm production as function of event activity and event particle multiplicity. These measurements play very important role in understanding the cold nuclear matter effects on charm production and in understanding of unexpected phenomena observed in p-Pb collisions at LHC. This is the one of the most important topics in field of current heavy ion collisions.

The thesis represents very impressive number of important physics results related to D+ production in p-Pb collisions measured by the ALICE experiment at LHC. It is divided to the 7 chapters. Chapter 1 gives very careful and nicely written introduction to the field of heavy ion collisions. It describes the properties of strong interaction, phase diagram of nuclear matter and it gives the relevant information of main observables of Quark-gluon plasma. Chapter 2 gives complete information about heavy flavor production. It describes the role of initial state and hot matter effects. It also reports the overview of heavy flavor measurements at RHIC and LHC. It is clear that candidate has very broad and deep knowledge of the field of heavy flavor production in pp and heavy ion collisions. In Chapter 3 the details of ALICE detector system are given and also the issue of biases of centrality determination in p-Pb collisions are discussed. The Chapter 4 contains the technical informations about the data analysis of p-Pb that candidate performed in order to reconstruct the D+ signals. It would be interesting to include, e.g. in attachments, more detailed information about the precision of MC simulations, used for corrections of data, in describing the variables that are used for D mesons reconstruction. In Chapter 5 D+ cross section and nuclear modification factor is extracted and discussed in context of similar measurements. In Chapter 6 the data driven method of beauty feed-down subtraction is applied to extracted D+ data. This will be especially important for future ALICE measurements. In Chapter 7 the D+ meson production as function of event multiplicity is studied.

The D+ mesons cross section was measured in large range of pT range of 1-24 GeV/c in p-Pb collisions. The nuclear modification factor is consistent with unity, this is consistent with model calculations of cold nuclear matter effects. The increase of the D+ meson production as function of event multiplicity in p-Pb collisions is found to be similar to those for D0 in p-p collisions.

Although the level of author contribution to the reported results was not stated explicitly, it is obvious that the candidate demonstrated in Chapers 4-7 the ability to perform the complex physics analysis, the skills to present the results in appropriate scientific manner and he is able to discuss the impact of the own results in general context. The candidate proved that he has knowledge and overview in the studied field which are necessary for his further contributions to this field of modern nuclear physics. What is extremely valuable and certainly not typical is the amount of obtained results.

The dissertation is worthy of defense without changes.

In Prague , 30.3.2015 Dr. Jaroslav Bielcik, Czech Technical University in Prague