Addendum

Adam, J.; Adamova, D.; Aggarwal, MM.; Rinella, G.A.; Agnello, A.; Agrawl, N.; Ahammed, Z.; Ahn, S.U.; Aimo, I.; Aiola, S.; Ajaz, M.; Akindinov, A.; Alam, SN; Aleksandrov, D.; Alessandro, B.; Alexandre, D.; Alfaro-Molina; Alici, A.; Alkin, A.; Almaraz, J.R.M.; Alme, J.; Bearden, Ian; Pacik, Vojtech; Zhou, You; Gajdosova, Katarina; Chojnacki, Marek; Gaardhøje, Jens Jørgen; Christensen, Christian Holm; Nielsen, Børge Svane; Bourjau, Christian Alexander; bsm989, bsm989; Pimentel, Lais Ozelin de Lima; Thoresen, Freja; Bilandzic, Ante; Zaccolo, Valentina; Bøggild, Hans

Published in:
Journal of High Energy Physics

DOI:
10.1007/JHEP06(2017)032

Publication date:
2017

Document Version
Publisher's PDF, also known as Version of record

Citation for published version (APA):
Addendum: Centrality dependence of high-\(p_T\) D-meson suppression in Pb–Pb collisions at \(\sqrt{s_{NN}} = 2.76\) TeV

E-mail: ALICE-publications@cern.ch

ADDENDUM TO: JHEP11(2015)205

ABSTRACT: This is an addendum to the article JHEP 11 (2015) 205 [1]. The figures 3 (right), 4 (right) and 5 are updated with published results on non-prompt J/\(\psi\)-meson production from the CMS collaboration [2].

ArXiv ePrint: 1506.06604

In [1] the average nuclear modification factor \(R_{AA}\) of D\(^0\), D\(^+\) and D\(^{++}\) mesons in Pb–Pb collisions at \(\sqrt{s_{NN}} = 2.76\) TeV measured by ALICE was compared with that of non-prompt J/\(\psi\) mesons from B-meson decays measured by the CMS collaboration using 2010 data (7.28\(\mu\)b\(^{-1}\)) [3]. A higher-precision measurement based on 2011 data (152\(\mu\)b\(^{-1}\)) was recently published by the CMS collaboration [2]. The measurement for the \(p_T\) interval 6.5–30 GeV/\(c\) is carried out in three rapidity intervals, including \(|y| < 1.2\), which is more similar to that of D mesons (\(|y| < 0.5\)).

Figure 1 shows the average of the D\(^0\), D\(^+\) and D\(^{++}\) nuclear modification factors as a function of centrality in 8 < \(p_T\) < 16 GeV/\(c\), compared with the \(R_{AA}\) of non-prompt J/\(\psi\) mesons with 6.5 < \(p_T\) < 30 GeV/\(c\) [2]. The latter is significantly higher than that of the D mesons in the five centrality intervals from 0–10\% to 40–50\%. For example, the average difference of the \(R_{AA}\) values of D mesons and non-prompt J/\(\psi\) mesons in the 0–10\% and 10–20\% centrality classes is larger than zero with a significance of 3.4 \(\sigma\), obtained including the systematic uncertainties, and taking into account their correlation between
Figure 1. Comparison of the D meson \( R_{\text{AA}} \) (average of \( D^0 \), \( D^- \) and \( D^{*-} \)) in \( 8 < p_T < 16 \text{ GeV}/c \) \cite{1} and of the \( R_{\text{AA}} \) of non-prompt J/\( \psi \) mesons in \( 6.5 < p_T < 30 \text{ GeV}/c \) measured by the CMS collaboration \cite{2}. The vertical bars represent the statistical uncertainties, while the filled (empty) boxes represent the systematic uncertainties that are correlated (uncorrelated) among centrality intervals. This figure updates figure 3 (right) of \cite{1}.

Figure 2. Comparison of the \( R_{\text{AA}} \) measurements with the calculations by Djordjevic et al. \cite{4} including radiative and collisional energy loss. Lines of the same style enclose a band representing the theoretical uncertainty. For non-prompt J/\( \psi \) mesons in \( 6.5 < p_T < 30 \text{ GeV}/c \) \cite{2} the model results for the case in which the b quark interactions are calculated using the c quark mass are shown as well \cite{7}. This figure updates figure 4 (right) of \cite{1}.
The conclusions of the original publication [1] are confirmed by the comparisons that consider the new $J/\psi$-meson measurements. In particular, the comparison of the D-meson $R_{AA}$ with the non-prompt $J/\psi$-meson $R_{AA}$ shows a difference in the suppression of particles originating from c and b quarks in the most central collisions. This observation is described by theoretical calculations in which in-medium parton energy loss decreases with increasing quark mass.

Open Access. This article is distributed under the terms of the Creative Commons Attribution License (CC-BY 4.0), which permits any use, distribution and reproduction in any medium, provided the original author(s) and source are credited.

References


SSC IHEP of NRC Kurchatov institute, Protvino, Russia
SUBATECH, Ecole des Mines de Nantes, Université de Nantes, CNRS-IN2P3, Nantes, France
Suranaree University of Technology, Nakhon Ratchasima, Thailand
Technical University of Košice, Košice, Slovakia
Technical University of Split FESB, Split, Croatia
The Henryk Niewodniczanski Institute of Nuclear Physics, Polish Academy of Sciences, Cracow, Poland
The University of Texas at Austin, Physics Department, Austin, Texas, U.S.A.
Universidad Autónoma de Sinaloa, Culiacán, Mexico
Universidade de São Paulo (USP), São Paulo, Brazil
Universidade Estadual de Campinas (UNICAMP), Campinas, Brazil
University of Houston, Houston, Texas, United States
University of Jyväskylä, Jyväskylä, Finland
University of Liverpool, Liverpool, United Kingdom
University of Tennessee, Knoxville, Tennessee, United States
University of the Witwatersrand, Johannesburg, South Africa
University of Tokyo, Tokyo, Japan
University of Tsukuba, Tsukuba, Japan
University of Zagreb, Zagreb, Croatia
Université de Lyon, Université Lyon 1, CNRS/IN2P3, IPN-Lyon, Villeurbanne, France
V. Fock Institute for Physics, St. Petersburg State University, St. Petersburg, Russia
Variable Energy Cyclotron Centre, Kolkata, India
Vinča Institute of Nuclear Sciences, Belgrade, Serbia
Warsaw University of Technology, Warsaw, Poland
Wayne State University, Detroit, Michigan, United States
Wigner Research Centre for Physics, Hungarian Academy of Sciences, Budapest, Hungary
Yale University, New Haven, Connecticut, United States
Yonsei University, Seoul, South Korea
Zentrum für Technologietransfer und Telekommunikation (ZTT), Fachhochschule Worms, Worms, Germany