J/ψ production in p-Pb collisions measured with ALICE at the LHC*

M. Winn[1], *A. Andronic*[2], *I. Arsene*[2,6], *C. Blume*[3], *J. Book*[3], *P. Braun-Munzinger*[2,4], *A. Maire*[1,7], *J. Stachel*[1], *S. Weber*[2], *J. Wiechula*[5] *for the ALICE Collaboration*

[1]Universität Heidelberg; [2]EMMI & GSI Darmstadt; [3]Universität Frankfurt; [4]Technische Universität Darmstadt; [5]Universität Tübingen; [6]University of Oslo; [7]Université de Strasbourg

Charmonium production in proton-nucleus (pA) collisions is a crucial ingredient for the interpretation of J/ψ production in nucleus-nucleus (AA) collisions, where it is a prominent probe of deconfinement. The measurement of modifications of the J/ψ yield in pA collisions with respect to proton-proton (pp) collisions give access to nuclear effects, which are commonly not attributed to the presence of a deconfined medium.

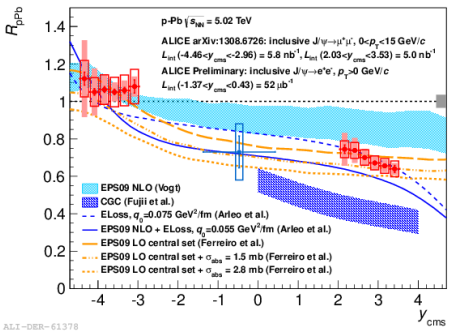

Figure 1: Nuclear modification factor for J/ψ production in p-Pb collisions measured by ALICE compared to theoretical models. The error bars represent the statistical uncertainty, the boxes the uncorrelated systematic uncertainties and the filled areas the partially correlated systematic uncertainties.

ALICE is unique among the detectors at LHC, since it accesses charmonium production down to transverse momentum $p_{\rm T}$=0 at mid-rapidity ($|y_{\rm lab}| < 0.9$) in the dielectron decay channel.

Preliminary results of inclusive $p_{\rm T}$-integrated and $p_{\rm T}$-differential cross sections and nuclear modification factors at mid-rapidity were released based on the proton-lead (p-Pb) collisions recorded at $\sqrt{s_{\rm NN}} = 5.02$ TeV with a minimum bias collision trigger in early 2013. They complement the measurements carried out in Pb-Pb [1] and pp [2–5] collisions.

Figure 1 compares the experimental data with theory predictions. The result at mid-rapidity is shown together with the result in the dimuon decay channel at forward and backward rapidity [6]. The measurements are consistent with predictions based on parametrisations of nuclear Parton Distribution Functions (nPDF) including moderate gluon shadowing [7,8] and on coherent energy loss [9]. The color class condensate model is disfavoured by data [10].

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The $p_{\rm T}$-differential $R_{\rm pA}$ is depicted in Fig. 2. The result is consistent with theoretical models based on shadowing [7].

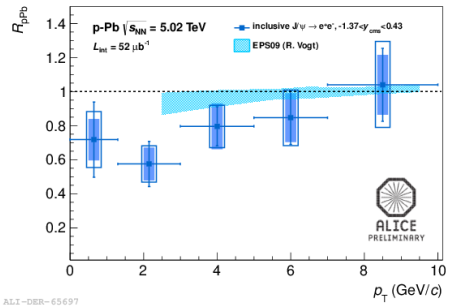

Figure 2: The nuclear modification factor as a function of transverse momentum compared with calculations by R.Vogt. The uncertainty denotations are analogous to Fig. 1.

Further analyses on J/ψ production are ongoing in the p-Pb collision system. The fraction $f_{\rm B}$ of J/ψ at mid-rapidity from decays of hadrons carrying bottom quarks and the dependence of J/ψ production on the charged hadron multiplicity will be measured. The acquired data sample with TRD triggers in p-Pb collisions at mid-rapidity will increase the available statistics for transverse momenta of J/ψ larger than 1 GeV/c [11].

References

[1] B. Abelev *et al.* [ALICE Collaboration], arXiv:1311.0214, see also I. Arsene *et al.*, this Report.

[2] K. Aamodt *et al.* [ALICE Collab.], Phys. Lett. B **704** (2011) 442 [Erratum-ibid. B **718** (2012) 692]

[3] B. Abelev *et al.* [ALICE Collab.], JHEP **1211** (2012) 065

[4] B. Abelev *et al.* [ALICE Collab.], Phys. Lett. B **718** (2012) 295

[5] B. Abelev *et al.* [ALICE Collab.], Phys. Lett. B **712** (2012) 165

[6] B. Abelev *et al.* [ALICE Collab.], arXiv:1308.6726, accepted for publication in JHEP

[7] J.L. Albacete *et al.*, Int. J. Mod. Phys. **E22** (2013) 1330007 and private communication with R. Vogt

[8] E. G. Ferreiro *et al.*, Phys. Rev. C **88** (2013) 047901

[9] F. Arleo and S. Peigné, JHEP **1303** (2013) 122

[10] H. Fujii and K. Watanabe, Nucl. Phys. A **915** (2013) 1

[11] J. Klein for the ALICE Collaboration, arXiv:1112.5110

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