

FCPPL Quarkonium Production Workshop

Report of Contributions

Contribution ID: 1

Type: **Talk**

Cold and hot medium effects on charmonium production in 5.02 TeV p-Pb collisions

Friday, March 31, 2017 11:20 AM (30 minutes)

We study cold and hot nuclear matter effects on charmonium production in p+Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV in a transport approach. As cold nuclear matter effects give almost the same modification on different $c\bar{c}$ states at the LHC energy, different nuclear modification factors of J/ψ and ψ' indicate the existence of the hot medium. In forward rapidity, we can explain well the J/ψ and ψ' yield and transverse momentum distribution measured by the ALICE collaboration, and we predict a significantly larger ψ' broadening in comparison with J/ψ . However, we can not reproduce the J/ψ and ψ' data at the backward rapidity with reasonable cold and hot medium effects.

Reference: Phys.Lett. B765 (2017) 323-327

Primary author: Dr CHEN, Baoyi (Tianjin University)

Co-authors: Prof. ZHUANG, Pengfei (Tsinghua University); Mr GUO, Tiecheng (Tsinghua University); Dr LIU, Yunpeng (Tianjin University)

Presenter: Dr CHEN, Baoyi (Tianjin University)

Session Classification: Proton-nucleus collisions

Track Classification: Proton-nucleus collisions

Contribution ID: 2

Type: **Talk**

The η_c hadroproduction

I will review the recent theoretical progress on the η_c meson hadroproduction and its impact on the extraction of the long-distance matrix elements for the J/ψ production.

Primary author: ZHANG, Hong-Fei

Session Classification: New observables

Track Classification: New observables

Contribution ID: 3

Type: **Talk**

On the $\Psi(2S)$ over J/ψ production yield in pp and pA collisions

Friday, March 31, 2017 10:45 AM (30 minutes)

Proton nucleus collisions are expected to be unique tool to probe the physics of the initial state of ultra relativistic heavy ion collisions, without the presence of thermalisation and collective evolution of high energy density QCD matter. However, many observations related to the production of light and strange hadrons at low transverse momentum (p_T) in p-Pb collisions at the LHC surprisingly exhibit a qualitative similarity to measurements in nucleus-nucleus collisions and are in qualitative agreement with hydrodynamical model

8 calculations. Similar observations have been performed in high multiplicity proton-proton collisions at the LHC. On the other hand, the experimental results of high p_T hadrons, jet, heavy quarks production in p-Pb collisions at the LHC can be explained as binary scaling with respect to pp collisions with a moderate shadowing effect as expected in the absence of collective phenomena. In the case of J/ψ and $Y(1S)$ production an additional energy loss mechanism has to be considered to explain their production. Among the hard probes, only the $\Psi(2S)$, $Y(2S)$ and $Y(3S)$ exhibit a puzzling behaviour in proton-nucleus collisions at the LHC, also observed for the $\Psi(2S)$ in central d-Au collisions at RHIC, and which violate the binary scaling. A priori, the observed relative suppression of these quarkonium resonances in p-A collisions, reveals the interpretation of the experimental results obtained in A-A collisions.

Primary author: Dr MARTINEZ-GARCIA, Gines (Subatech CNRS)

Presenter: Dr MARTINEZ-GARCIA, Gines (Subatech CNRS)

Session Classification: Proton-nucleus collisions

Track Classification: Proton-nucleus collisions

Contribution ID: 4

Type: **Talk**

Calculation of coherent J/ψ photoproduction in hadronic A+A collisions at RHIC and LHC

Friday, March 31, 2017 4:25 PM (30 minutes)

The coherent photon-nucleus interactions has been studied in detail at RHIC and LHC to probe the gluon distribution in nucleus at low Feynman x via relativistic heavy-ion collisions. These kind of interactions are traditionally thought to only exist in ultra-peripheral collisions, where there is no hadronic interactions. Recently, a significant excess of J/ψ yield at very low transverse momentum ($p_T < 0.3$ GeV/c) was observed by the ALICE and STAR collaborations in peripheral A+A collisions, which points to evidence of coherent photoproduction of J/ψ in violent hadronic interactions. The survival of photoproduced J/ψ merits theoretical investigation. In addition, with respect to the expectation of theoretical calculations, the excess yield of J/ψ in hadronic heavy-ion collisions may served as a good probe to test the cold and hot medium effects.

In this presentation we report on calculations of coherent photon-nucleus ($\gamma + A \rightarrow J/\psi + A$) interactions in hadronic A+A collisions at RHIC and LHC energies. We also address the questions about how the electromagnetic field translates into a flux of equivalent photons in hadronic A+A collisions: if the photons is emitted from the whole nucleus, or if only the spectator fragments contribute to the photon emission. Similarly, it is not clear whether the whole nucleus or only spectator fragment act as photon target. The model used to calculate the cross section will be discussed and the expected yield will be compared with experimental results from RHIC and LHC. The differential centrality, rapidity and transverse momentum distributions from calculations will also be compared between different scenarios.

Primary author: ZHA, Wangmei (USTC/BNL)

Presenter: ZHA, Wangmei (USTC/BNL)

Session Classification: Nucleus-nucleus collisions

Track Classification: Nucleus-nucleus collisions

Contribution ID: 5

Type: **Talk**

Stability of fully heavy tetraquarks

Saturday, April 1, 2017 4:35 PM (30 minutes)

We discuss the stability of tetraquarks systems made of two heavy quarks and two heavy anti-quarks, with a potential model whose linear part is inspired by string dynamics.

At variance with some recent or less recent claims, we do not find binding for the double-charmonium or double-bottomonium cases. The string dynamics is, however, more favorable for $(bc\bar{b}\bar{c})$, i.e., a charmonium-bottomonium compound.

Some comments are made on the diquark-antidiquark approximation for describing these structures.

This talk is based on the paper: arXiv:1703.00783, to appear in Phys. Rev D.

Primary authors: RICHARD, Jean-Marc (IPNL); Prof. VALCARCE, Alfredo (Salamanca U.); Prof. VIJANDE, Javier (Valencia U.)

Presenter: RICHARD, Jean-Marc (IPNL)

Session Classification: New observables

Track Classification: New observables

Contribution ID: 6

Type: **Talk**

Quarkonium production in heavy-ion collisions at SPS and RHIC

Friday, March 31, 2017 2:45 PM (30 minutes)

Primary author: TANG, Zebo (University of Science and Technology of China)

Presenter: TANG, Zebo (University of Science and Technology of China)

Session Classification: Nucleus-nucleus collisions

Track Classification: Nucleus-nucleus collisions

Contribution ID: 7

Type: **Talk**

Theory of quarkonium production and suppression in nuclear collisions

Friday, March 31, 2017 2:00 PM (40 minutes)

I will discuss in this talk the mechanisms for quarkonium production and suppression in high energy nuclear collisions from SPS to RHIC, LHC and FCC energies.

Primary author: Prof. ZHUANG, pengfei (tsinghua university)

Presenter: Prof. ZHUANG, pengfei (tsinghua university)

Session Classification: Nucleus-nucleus collisions

Track Classification: Nucleus-nucleus collisions

Contribution ID: 8

Type: **Talk**

Energy dependence of direct-quarkonium production in pp collisions from fixed-target to LHC energies:complete one-loop analysis.

Thursday, March 30, 2017 3:45 PM (30 minutes)

We compute the energy dependence of the p_T -integrated cross section of directly produced quarkonia in pp collisions at next-to-leading order within the nonrelativistic QCD framework. We treat the p_T -integrated and the p_T -differential cross sections as two different observables to investigate whether the CO LDMEs extracted from the fits of the p_T -differential cross sections can predict the p_T -integrated cross sections. We also consider the cross sections calculated in CSM and CEM. Our study do not support the past claims that color-octet transitions are dominantly responsible for low- p_T quarkonium production.

Primary authors: FENG, Yu (Third Military Medical University, Chongqing,Southwest of China); LANSBERG, Jean-Philippe (IPN Orsay, Paris Sud U. / IN2P3-CNRS); WANG, Jianxiong (IN)

Presenter: FENG, Yu (Third Military Medical University, Chongqing,Southwest of China)

Session Classification: Proton-proton collisions

Track Classification: Proton-proton collisions

Contribution ID: 9

Type: **Talk**

$\Upsilon + J/\psi$ and $J/\psi + J/\psi$ production at hadron colliders and double parton scattering

Saturday, April 1, 2017 2:45 PM (40 minutes)

We present the first complete study of Υ and prompt J/ψ production from single-parton scattering to the complete $\mathcal{O}(\alpha_s^6)$ for color singlet contribution and including all leading SPS contributions. We find that the effective cross section characterizing the importance of double-parton scatterings is $\sigma_{eff} \leq 8.2$ mb at 68% confidence level from the D0 measurement. At the same time, we also present $J/\psi + J/\psi$ production at hadron colliders.

Primary author: Dr ZHANG, Yu-Jie (Beihang University)

Co-authors: Dr SHAO, Hua-Sheng; Prof. LANSBERG, Jean-Philippe

Presenter: Dr ZHANG, Yu-Jie (Beihang University)

Session Classification: New observables

Track Classification: New observables

Contribution ID: 10

Type: **Talk**

Double heavy production in high energy colliders

Saturday, April 1, 2017 2:00 PM (40 minutes)

Two or more heavy quark-antiquark pairs can be produced in high energy collisions, not only because of increase of centre-of-mass energy, but also due to multiple parton scattering in case of hadron collisions. This will be a brief experimental overview on the double heavy production involving at least one quarkonium in the final state in pp collisions at LHC, as well as in e^+e^- collisions at B-factories.

Primary author: Dr LI, Yiming (IHEP, CAS)**Presenter:** Dr LI, Yiming (IHEP, CAS)**Session Classification:** New observables**Track Classification:** New observables

Contribution ID: 11

Type: **Talk**

Double charm baryon production

Friday, March 31, 2017 5:00 PM (30 minutes)

We first study the doubly charmed baryon Ξ_{cc}^+ structure and yield in high energy nuclear collisions. Using hypericospherical expansion method, we solved the three-body Schrödinger equation including relativistic correction and calculate the yield of Ξ_{cc}^+ via coalescence mechanism. We find that, the Ξ_{cc}^+ created in heavy ion collision is like a quark-diquark state as a consequence of chiral symmetry restoration in hot medium, and the yield is extremely enhanced due to the large number of charm quarks.

Primary author: ZHAO, jiaxing**Co-author:** ZHUANG, Pengfei (Tsinghua University)**Presenter:** ZHAO, jiaxing**Session Classification:** Nucleus-nucleus collisions**Track Classification:** Nucleus-nucleus collisions

Contribution ID: 12

Type: **Talk**

Analytical Calculation for the Gluon Fragmentation into Spin-triplet S-wave Quarkonium

Thursday, March 30, 2017 4:50 PM (30 minutes)

Fragmentation function of gluon to the spin-triplet color-singlet S-wave quarkonium has been calculated numerically earlier in 1992. However, the analytical result is absent because of the complex high dimensional integrals. With the development of the high-loop calculation, we consider to solve the problem with the IBP reduction. I will present our method and the final result, which is compatible with the numerical value before. Furthermore, we give the polarization results and the corresponding relative- v^2 corrections.

Primary authors: ZHANG, Peng (Peking University); MA, Yan-Qing (Peking University); CHAO, Kuang-Ta (Peking University)

Presenter: ZHANG, Peng (Peking University)

Session Classification: Proton-proton collisions

Track Classification: Proton-proton collisions

Contribution ID: 13

Type: **not specified**

Round table on current th & exp results

Thursday, March 30, 2017 6:00 PM (30 minutes)

Session Classification: Proton-proton collisions

Contribution ID: 14

Type: **not specified**

Welcome

Thursday, March 30, 2017 2:00 PM (15 minutes)

Session Classification: Proton-proton collisions

Contribution ID: 15

Type: **not specified**

Introductory experimental talk

Session Classification: Proton-proton collisions

Contribution ID: 16

Type: **not specified**

Introductory theoretical talk

Thursday, March 30, 2017 3:00 PM (40 minutes)

Presenter: WANG, Jianxiong (IN)

Session Classification: Proton-proton collisions

Contribution ID: 17

Type: **Talk**

Associate Production of Quarkonium with a Vector Boson

Saturday, April 1, 2017 5:10 PM (30 minutes)

Here is a brief overview on the quarkonium production associated with a vector boson, such as photon, W or Z.

Primary author: Dr LI, Rong (Xi'an Jiaotong University)

Presenter: Dr LI, Rong (Xi'an Jiaotong University)

Session Classification: New observables

Track Classification: New observables

Contribution ID: **18**

Type: **not specified**

Introductory experimental talk

Session Classification: Proton-nucleus collisions

Contribution ID: **19**

Type: **not specified**

Results from SMOG-LHCb

Saturday, April 1, 2017 9:00 AM (40 minutes)

Presenter: ROBBE, Patrick (Universite de Paris-Sud 11 (FR))

Session Classification: Prospects for the fixed target mode at the LHC

Contribution ID: 20

Type: **not specified**

The AFTER@LHC project and quarkonium production studies

Saturday, April 1, 2017 9:45 AM (40 minutes)

Presenter: LANSBERG, Jean-Philippe (IPN Orsay, Paris Sud U. / IN2P3-CNRS)

Session Classification: Prospects for the fixed target mode at the LHC

Contribution ID: 21

Type: **not specified**

ALICE prospects in the fixed target mode

Session Classification: Prospects for the fixed target mode at the LHC

Contribution ID: 22

Type: **not specified**

Coffee break

Session Classification: Prospects for the fixed target mode at the LHC

Contribution ID: 23

Type: **not specified**

Round table

Saturday, April 1, 2017 11:00 AM (1 hour)

Session Classification: Prospects for the fixed target mode at the LHC

Contribution ID: 24

Type: **not specified**

Round table on NRQCD fits and new observables

Saturday, April 1, 2017 5:45 PM (30 minutes)

Session Classification: New observables

Contribution ID: 25

Type: **not specified**

Round table on double HQ production

Saturday, April 1, 2017 3:30 PM (30 minutes)

Session Classification: New observables

Contribution ID: 26

Type: **Talk**

Quarkonium production in p(d)+A collisions at LHC and RHIC

Friday, March 31, 2017 8:30 AM (40 minutes)

An overview on recent experimental measurements about quarkonia productions in proton(deuteron)-ion collisions at LHC and RHIC will be presented.

Primary author: ZHU, Xianglei (Tsinghua University)

Presenter: ZHU, Xianglei (Tsinghua University)

Session Classification: Proton-nucleus collisions

Track Classification: Proton-nucleus collisions

Contribution ID: 27

Type: **Talk**

Experimental study of quarkonium production in pp collisions

Thursday, March 30, 2017 2:15 PM (40 minutes)

The experimental study of quarkonium production in pp collisions will be reviewed in this talk.

Primary author: HE, Jibo (University of Chinese Academy of Sciences (CN))

Presenter: HE, Jibo (University of Chinese Academy of Sciences (CN))

Session Classification: Proton-proton collisions

Track Classification: Proton-proton collisions

Contribution ID: 28

Type: **Talk**

Quarkonium produciton in nucleus-nucleus collisions at LHC

Friday, March 31, 2017 3:20 PM (30 minutes)

Primary author: KWEON, Min Jung (Inha University (KR))

Presenter: KWEON, Min Jung (Inha University (KR))

Session Classification: Nucleus-nucleus collisions

Track Classification: Nucleus-nucleus collisions

Contribution ID: 29

Type: **not specified**

Theory of quarkonium production in proton-nucleus collisions

Friday, March 31, 2017 9:15 AM (30 minutes)

Presenter: ZHANG, Hong-Fei

Session Classification: Proton-nucleus collisions

Contribution ID: **30**

Type: **not specified**

Round table

Friday, March 31, 2017 9:50 AM (25 minutes)

Session Classification: Proton-nucleus collisions

Contribution ID: **31**

Type: **not specified**

Round table

Friday, March 31, 2017 11:55 AM (35 minutes)

Session Classification: Proton-nucleus collisions

Contribution ID: **32**

Type: **not specified**

Round table

Friday, March 31, 2017 5:35 PM (30 minutes)

Session Classification: Nucleus-nucleus collisions

Contribution ID: 33

Type: **not specified**

A new factorization theory for quarkonium production and decay

Thursday, March 30, 2017 5:25 PM (30 minutes)

Primary author: MA, Yan-Qing (BNL)

Presenter: MA, Yan-Qing (BNL)

Session Classification: Proton-proton collisions

Contribution ID: 34

Type: **not specified**

Quarkonium hadroproduction studies in their hadronic decay channels

Primary author: BARSUK, Sergey (Universite de Paris-Sud 11 (FR))

Session Classification: New observables