

COLLABORATION AGREEMENT

IN2P3 - COPIN

I. Identification of the laboratories

Partner	COPIN
IN2P3 laboratories	IJCLab
Partner laboratories	Varsovie (NCNR) Varsovie (Politechnika Warszawska) Wroclaw (IFT)

II. Identification of the collaboration

Title of the collaboration	KT factorisation and quarkonium production in the LHC era
Number of the collaboration	12-147
IN2P3 spokesperson	J.P. LANSBERG
COPIN spokesperson	L. SZYMANOWSKI
Scientific Domain	Hadronic and Particle Physics

Status of the collaboration

Status	The renewal of the collaboration is requested for the period January 1st - December 31st, 2023
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III. Status report for the period January 1st to December 31st, 2022

III.1 IN2P3 scientists in COPIN

Total time approved for 2022	0
Total time used for 2022	0
List of scientists	1. Jean-Philippe Lansberg (7 days paid by NCBJ) (days) 2. Carlo Flore (7 days paid by NCBJ) (days) 3. Yelyzaveta Yedelkina (3 days paid by NCBJ) (days)

III.2 COPIN scientists in France

Total time approved for 2022	30
Total time used for 2022	30
List of scientists	1. Maxim Nefedov (24 days) 2. Laboni Manna (6 days)

III.3 Scientific results of the above-mentioned collaboration

On going projects:

PhD of A. Safronov (who was a Paris Saclay U. M2 student under the supervision of J.P. Lansberg) in WUT under the supervision of D. Kikola (+ partial co-supervision of J.P. Lansberg) on the implementation of the computation of cross sections in proton-nucleus collisions in Madgraph at NLO. He has presented his results at ICHEP2022(see below). The results of his PhD will greatly contribute to the expansion of the EU funded Virtual Access NLOAccess which is part of STRONG2020. A. Safronov has visited A. Kusina in Krakow in Spring. C. Flore (who is in charge of NLOAccess) and J.P. Lansberg has worked with him during the week-long collaboration meeting in July.

PhD of L. Manna has started in WUT under the supervision of D. Kikola (+ partial co-supervision of J.P. Lansberg) on the implementation of the computation of cross sections in photon-hadron and lepton-hadron collisions in Madgraph at NLO. The results of her PhD will greatly contribute to the expansion of the NLOAccess and this consolidates the contribution of WUT in NLOAccess. Her abstract for an oral communication at QCD@LHC2022 in November has been accepted. C. Flore (who is in charge of NLOAccess) and J.P. Lansberg has worked with him during the week-long collaboration meeting in July. She attended for 2 weeks the programme HF2022 at the Institut Pascal in Orsay.

PhD of Y. Yedelkina in IJCLab on the quarkonium production with QCD corrections. During her first year of her PhD, she has learnt how to improve the computation of NLO QCD corrections using IBP reduction method with M. Nefedov.

Matching High Energy and Collinear Factorisation in quarkonium production with M. Nefedov who has joined NCBJ Warsaw in December 2021. He will join IJCLab in December 2022 as he has been awarded a Marie Skłodowska-Curie grant to advance his work on this topic. Together, with J.P. Lansberg and M. A. Ozelik, he has published a paper in JHEP, he delivered a talk at QCDWG2022 at GSI and DIS2022 in Santiago on this work and J.P. Lansberg on the same topic at Low-x Diffraction 2022 in September. He attended for 3 weeks the programme HF2022 at the Institut Pascal in Orsay and gave the opening talk of the programme.

Heavy-quark constraints on nuclear PDFs with A. Kusina, J.P. Lansberg, S. Delorme (+ H.S. Shao, I. Schienbein, A. Safronov, L. Manna). We continue our investigations on how to constrain gluon nuclear PDF with heavy-flavour data at RHIC and the LHC (and later EIC). A. Kusina attended for 10 days the programme HF2022 at the Institut Pascal in Orsay and gave a seminar on this subject during the programme.

Publications:

[White Paper on Forward Physics, BFKL, Saturation Physics and Diffraction](#), [Martin Hentschinski](#) (Americas U., Puebla), [Christophe Royon](#) (Kansas U.), [Marco Alcazar Peredo](#) (Americas U., Puebla), [Cristian Baldenegro](#) (Ecole Polytechnique), [Andrea Bellora](#) (INFN, Turin) et al. e-Print: [2203.08129](#) [hep-ph]

[Matching next-to-leading-order and high-energy-resummed calculations of heavy-quarkonium-hadroproduction cross sections](#), [Jean-Philippe Lansberg](#) (IJCLab, Orsay), [Maxim Nefedov](#) (IJCLab, Orsay and NCBJ, Warsaw), [Melih A. Ozelik](#) (IJCLab, Orsay and Karlsruhe U., TTP) e-Print: [2112.06789](#) [hep-ph] DOI: [10.1007/JHEP05\(2022\)083](#) Published in: JHEP 05 (2022), 083

[Prospects for quarkonium studies at the high-luminosity LHC](#), [Emilien Chapon](#) (Beijing, Inst. High Energy Phys.), [David d'Enterria](#) (CERN), [Bertrand Ducloue](#) (Edinburgh U. and U. Edinburgh, Higgs Ctr. Theor. Phys.), [Miguel G. Echevarria](#) (Alcala de Henares U.), [Pol-Bernard Gossiaux](#) (SUBATECH, Nantes) et al. e-Print: [2012.14161](#) [hep-ph] DOI: [10.1016/j.ppnp.2021.103906](#) Published in: Prog.Part.Nucl.Phys. 122 (2022), 103906

Talks & seminars:

J.P. Lansberg:

1. Diffraction and Low-x 2022. 24–30 Sept 2022. Corigliano Calabro, Italy. <https://indico.cern.ch/event/1148802/>

A. Kusina:

1. HF2022: Heavy Flavours from small to large systems. 3–21 Oct 2022. Institut Pascal, Paris Saclay U. , Orsay
<https://indico.iijclab.in2p3.fr/event/7656/>

M. Nefedov:

1. HF2022: Heavy Flavours from small to large systems. 3–21 Oct 2022. Institut Pascal, Paris Saclay U. , Orsay
<https://indico.iijclab.in2p3.fr/event/7656/>

2. QWG 2022 - The 15th International Workshop on Heavy Quarkonium. 26-30 septembre 2022. GSI Darmstadt <https://indico.gsi.de/event/13128/>

3.

DIS2022: XXIX International Workshop on Deep-Inelastic Scattering and Related Subjects, May 2-6, 2022, Santiago de Compostela, Spain
<https://indico.cern.ch/event/1072533/>

L. Manna:

1. QCD@LHC2022, 28 Nov - 2 Dec 2022. IJCLab Orsay <https://indico.cern.ch/e/QCDatLHC2022>

A. Safronov:

1. ICHEP2022, 6–13 jul.. 2022 Bologna, Italy <https://agenda.infn.it/event/28874/>

Y. Yedelkina:

1. Quarkonia As Tools 2022. 9–15 Jan 2022. Centre Paul Langevin, Aussois <https://indico.cern.ch/event/1084752/>

2. HF2022: Heavy Flavours from small to large systems. 3–21 Oct 2022. Institut Pascal, Paris Saclay U. , Orsay
<https://indico.iijclab.in2p3.fr/event/7656/>

K. Lynch

1. HF2022: Heavy Flavours from small to large systems. 3–21 Oct 2022. Institut Pascal, Paris Saclay U. , Orsay
<https://indico.iijclab.in2p3.fr/event/7656/>

C. Flore

1. HF2022: Heavy Flavours from small to large systems. 3–21 Oct 2022. Institut Pascal, Paris Saclay U. , Orsay
<https://indico.iijclab.in2p3.fr/event/7656/>

2. Quarkonia As Tools 2022. 9–15 Jan 2022. Centre Paul Langevin, Aussois <https://indico.cern.ch/event/1084752/>

3. QWG 2022 - The 15th International Workshop on Heavy Quarkonium. 26-30 septembre 2022. GSI Darmstadt <https://indico.gsi.de/event/13128/>

Workshop/meeting organisation:

1. COPIN-IN2P3 quarkonium meeting. 25-29 Jul 2022, NBCJ & WUT (Warsaw) <https://indico.cern.ch/event/1180388/> (10 COPIN-IN2P3 participants)

2. Quarkonia As Tools 2022. 9–15 Jan 2022. Centre Paul Langevin, Aussois <https://indico.cern.ch/event/1084752/> (10+ COPIN-IN2P3 participants)

3. Aussois quarkonium week 2022. 27 March 2022 to 3 April 2022. Centre Paul Langevin, Aussois. <https://indico.cern.ch/event/1122003/> (15+ COPIN-IN2P3 participants)

4. HF2022: Heavy Flavours from small to large systems. 3–21 Oct 2022. Institut Pascal, Paris Saclay U. , Orsay
<https://indico.iijclab.in2p3.fr/event/7656/> (12+ COPIN-IN2P3 participants)

IV. Renewal of the collaboration for 2023

IV.1 Proposed scientific program

Description

For 2023, we would like to transfer the coordination on the Polish side from NCBJ, Warsaw (L. Szymanowski) to IFJ-PAN, Krakow (A. Kusina). The online form does not allow for that while keeping the same project.

Our main activities will revolve around:

Determination of the gluon nuclear PDFs (A. Kusina, J.P. Lansberg, I. Schienbein, H.S. Shao)

PhD of A. Safronov (WUT, asymmetric collisions in Madgraph NLO, in particular for proton-nuclear / hadron-hadron collisions) + associated

phenomenology (LHC, RHIC, COMPASS++/AMBER)

PhD of L. Manna (WUT, lepton/photon induced collisions in Madgraph at NLO) + associated phenomenology (EIC, UPC at LHC)

PhD of Y. Yedekina (IJCLab, quarkonium + jets at NLO)

PhD of K. Lynch (IJCLab, isolated quarkonia)

PhD of E. Li (IJCLab, NLO shock waves with heavy quarks, S. Wallon, L. Szymanowski)

MSCF EU project of M. Nefedov (IJCLab, HEF/kT factorisation for quarkonium production at NLO)

EU VA NLOAccess between IJCLab, LPTHE, UCLouvain and WUT (Inclusion of TMD factorisation by C. Flett, postdoc paid by IN2P3 and J. Bor PhD student; PI J.P. Lansberg)

QCD corrections to exclusive processes to study GPDs (S.Nabeebaccus, J. Wagner, L. Szymanowski)

Review on the quarkonium physics at the EIC (editors; J.P. Lansberg, M.Nefedov, D. Kikola)

IV.2 Estimated duration for IN2P3 scientists in COPIN	
Total time requested for 2023	40
List of scientists	<ol style="list-style-type: none">1. J.P. Lansberg (5 days)2. S. Wallon (5 days)3. M. Nefedov (5 days)4. E. Li (5 days)5. J. Bor (5 days)6. C. Flett (5 days)7. K. Lynch (5 days)8. S. Naabeebaccus (5 days)
IV.3 Estimated duration for COPIN scientists in France	
Total time requested for 2023	42
List of scientists	<ol style="list-style-type: none">1. A. Kusina (6 days)2. S. Delorme (6 days)3. L. Manna (10 days)4. A. Safronov (10 days)5. L. Szymanowski (5 days)6. J. Wagner (5 days)

Comment Validation	
Unity Director	Fadi IBRAHIM (IJCLab) - 2022-10-13 17:44:59