



Laurent Favart

Curriculum Vitae

Professional Situation

- 1995-1997 **Postdoctoral Researcher at the Laboratoire de l'Accélérateur Linéaire, Orsay, France**
- 1997-1999 **Postdoctoral Researcher FNRS, IIHE, ULB**
- 1999-2009 **Research Associate FNRS, IIHE, ULB**
- 2004- **Part-time Lecturer, ULB**
- 2009-2014 **Senior Research Associate F.R.S.-FNRS, IIHE, ULB**
- 2013-2021 **Director of the Particle Physics Department, IIHE, ULB**
- 2013-2021 **IIHE co-director**
- 2014- **Research Director, F.R.S.-FNRS, IIHE, ULB**

Formal Education

- 1989-1990 **Master 1 in Physics, Université Libre de Bruxelles, Belgium, magna cum laude**
- 1990-1991 **Master 2 in Physics, Université Libre de Bruxelles, Belgium, summa cum laude**
- 1991-1995 **PhD in Physics, Université Libre de Bruxelles, Belgium, summa cum laude**
Mesure de la fonction de structure F_2 du proton à HERA, utilisant les interactions profondément inélastiques radiatives (α^3).

Participation to High Energy Experiments

- 1992- Member of the H1 Collaboration at the HERA collider (DESY-Hamburg)
- 2011- Member of the CMS Collaboration at the LHC collider (CERN-Geneva)

Teaching at the University

- PHYS-F305 Lecture : Introduction to Particle Physics (BA3 Physics, Th: 24h, Ex: 24h)
- PHYS-F477 Lecture : Physics of Strong Interactions (MA1 Physics, Th: 24h, Ex: 24h)

University Administration

- 2009-2011 Secretary of the Jury - Master in Physics
- 2011-2014 President of the Jury - Master in Physics
- 2013-2021 Director of the Particle Physics Department

Thesis Promotor

PhD Promotor

- Rainer Stamen : "Measurement of Deeply Virtual Compton Scattering at HERA", (cotutelle - D. Wegener - Dortmund Universität (1998-2001).
- Benoît Roland : "Mesure de la diffusion Compton à haute virtualité à HERA II" (2002-2008, Boursier FRIA)
- Tomáš Hreus : "Studies of Diffractive Scattering of Photons at Large Momentum Transfer And of the VFPS Detector at HERA" (cotutelle University Pavol Jozef Šafárik à Košice, Slovaquie, Boursier FRIA, 2004-2008)
- Julie Delvax : "Etude de la production de jets en diffraction à HERA, à l'aide du spectromètre à protons VFPS", (Bourse FNRS 2006-2010).
- Alexandre Léonard : "Measurement of Z boson production in association with jets at the LHC and study of a DAQ system for the triple-GEM detector in view of the CMS upgrade", June 2015, (Aspirant FNRS 2011-2015).
- Fengwangdong Zhang : "Measurement of jet production in association with a Z boson at the LHC and jet energy correction and calibration at high level trigger in CMS", June 2017, Co-Phd with Peking University (Bourse CSC 2014-2017).
- Qun Wang : "Measurement of the differential cross section of Z boson production in association with jets at the LHC", June 2018, Co-PhD with Peking University (Bourse CSC 2015-2017)
- Louis Moureaux : "Measurement of the transverse momentum of Drell-Yan lepton pairs over a wide mass range in proton-proton collisions at $\sqrt{s} = 13$ TeV in CMS", September 2021, Bourse FRIA 2017-2021)
- Tomas Kello : "Constraining anomalous Higgs boson couplings using the CMS detector at the Large Hadron Collider", November 2023, Co-PhD with UA (Bourse EOS)
- Max Vanden Bemden, CMS data analysis and Proton Transverse Momentum Distributions, assistant ULB 2019-
- Itana Bubanja, Study of the Drell-Yan process at the LHC, cotutelle ULB-Montenegro 2020-
- Eliott Ducarme, Study of the Drell-Yan process at low mass, assistant ULB 2023-

Master Thesis Promotor

- Alexandre Rechner : "Analyse du détecteur à fibres scintillantes prévu pour le spectromètre à protons de l'expérience H1", June 2001.
- Sandrine Cnockaert : "Production diffractive de mésons vecteurs à HERA", (co-direction avec P. Marage), June 2002.
- Tomáš Hreus : "Photon diffractive scattering off proton at high t with the H1 detector", (Erasmus 2003-2004) - June 2004.
- Julie Delvax : "Etude des interactions avec production de jets dans l'expérience H1", June 2006.
- Alexandre Léonard, "Production diffractive de mésons ρ à HERA II", June 2011, Prix A.Sc.Br. 2011.
- Rachel Simoni, "Etude de la production de Z accompagnée de jets au LHC", September 2013.
- Patrick Connor, "Etude du processus de Drell-Yan à haute masse invariante au LHC à $\sqrt{s} = 8$ TeV", June 2014
- Laurent Lenaerts, "Etude de la section efficace Drell-Yan à faible impulsion transverse du boson Z dans les interactions proton-protons à $\sqrt{s} = 8$ TeV", June 2015
- Louis Moureaux, "Etude de la production exclusive du meson ρ dans les données proton-plomb prises à CMS en 2013 à $\sqrt{S_{NN}} = 5.02$ TeV", June 2017
- Max Vanden Bemden, "Study of the Proton Transverse Momentum Distributions with the Parton Branching Method", September 2019.
- Lucas Weinberg, "Study of the Drell-Yan Process Associated with Multijet Production at the LHC", Augustus 2021.

PhD Jury Member outside ULB

In top of my participation to one or two PhD Jury every year at ULB:

- Grégory Soyez, "Deep inelastic scattering at small x ", Université de Liège, January 2004.
- Thibault Frisson, "Mesure de luminosité pour l'expérience H1 et étude de la diffusion Compton élastique", Ecole Polytechnique, Paris, October 2006.
- Sylvestre Baudrand, "Mesure de la polarisation longitudinale de faisceaux de positons et d'électrons à HERA par effet Compton à l'aide d'une cavité Fabry-Perot de haute finesse", Université de Paris-Sud, Orsay, January 2007.
- Maxime Gouzevitch, "Mesure de la constante de couplage forte α_S avec les jets hadroniques en diffusion inélastique profonde", Ecole Polytechnique (Paris), September 2008.
- Ahmed Fradi, "Exclusive electroproduction of the ρ^+ meson on the proton with the CLAS detector at Jefferson Lab", IPN - Université de Paris-Sud (Orsay), July 2009.
- Deniz Sunar, "Measurement of $K^{*\pm}(892)$ Production in Deep Inelastic ep Scattering with the H1 Detector at HERA", Universiteit Antwerpen (Anvers), July 2009.
- Oldřich Kepka, "QCD and Diffraction in the ATLAS Experiment at the LHC", Université de Paris-Sud et Charles University, Orsay, November 2009.
- Séverine Ovin, "Photoproduction of Top and Higgs Particles at the LHC", Université Catholique de Louvain, April 2010.
- Nikita Beliy, "Search for top s-quarks in bottom s-quark production in R-parity violating supersymmetric models with the CMS detector", Université de Mons, 4 December 2015.
- Laurent Forthomme, "Measurement of exclusive two-photon processes with dilepton final states in pp collisions at the LHC", PhD, Université catholique de Louvain, April 2016
- Matthias Saimpert, "Mesure de la section efficace de production de paires de photons isolés dans l'expérience ATLAS au LHC et étude des couplages à quatre photons", PhD, rapporteur, CEA/Orsay, 27 June 2016
- Alex Van Spilbeeck, "Study of the very forward jet energy spectrum in proton-proton collisions at $\sqrt{s} = 7$ TeV with the CASTOR calorimeter at the CMS experiment", PhD, Universiteit Antwerpen (Anvers), June 2017
- Bugra Bilin, "Measurements of Standard Model heavy particle production in association with jets using proton-proton collision data at 8 and 13 TeV with the CMS experiment at the LHC", PhD, Middle East Technical University, Turkey, June 2017
- Brieuc François, "Search for resonant di-Higgs production in CMS and development of a model independent approach to look for new physics at the LHC", PhD, Université catholique de Louvain, October 2017.
- Brian Ventura, "Study of Deeply Virtual Compton Scattering at COMPASS at CERN", PhD, Université Paris-Saclay, 2 December 2021
- Aron Mees van Kampen, "Improving the Accuracy of Transverse Momentum Dependent Parton Branching Methods for Collider Physics", PhD, Universiteit Antwerpen (Anvers), 16 April 2024

Expert and Consultancy Mandates

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| 1996- | Internal Referee for the H1 and CMS Collaborations |
| 1999- | Referee for International Journals: Eur. Phys. J., Can. J. Phys., Braz. Jour. Phys. and Korean Physical Society |
| 2010-2012 | Member of the "SPS and PS experiments Committee (SPSC)" of CERN. |
| 2012- | Member of the H1 Physics Board |
| 2012- | Representative of the FNRS at the "International Oversight and Finance Group" (IOFG) of the IceCube experiment. |
| 2012-2022 | Member of the Belgian CERN Associates and Fellows committee. |

- 2013-2020 Official Representative of the FNRS at the "Astroparticle Physics European Consortium" (ApPEC).
- 2016- Member of the CMS Publication Committee Board on Forward & Small-x QCD physics (FSQ) and Detector and reconstruction performance (PRF)
- 2019- FNRS representation in the Finance Board of the Pierre Auger Collaboration
- 2019- Member of the FRIA jury (president in 2023 and 2024)
- 2021-2023 Member of the ULB university ranking committee

Awards and Honours

Ph.D. Award 1995 from the Friends and Sponsors of DESY DESY ("Verein der Freunde und Förderer des DESY")

Publications

Among the 1300 international Journal publications with peer review since 1992, the most representative are:

- C. Adloff et al. [H1 Collaboration], "Elastic photoproduction of J/ψ and Υ mesons at HERA", *Phys. Lett. B* **483** (2000), 23-35
- C. Adloff et al. [H1 Collaboration], "Deep-inelastic inclusive ep scattering at low x and a determination of α_s ", *Eur. Phys. J. C* **21** (2001), 33-61
- C. Adloff et al. [H1 Collaboration], "Measurement of deeply virtual Compton scattering at HERA", *Phys. Lett. B* **517** (2001), 47-58
- L. Favart, M.V.T. Machado, "Deeply virtual Compton scattering and saturation approach", *Eur. Phys. J. C* **29**, 365-371 (2003).
- A. Aktas et al. [H1 Collaboration], "Diffractive deep-inelastic scattering with a leading proton at HERA", *Eur. Phys. J. C* **48** (2006), 749-766
- L. Favart, M. V. T. Machado and L. Schoeffel, "An extraction of the skewing factor from DESY-HERA Data", *Braz. J. Phys.* **37** (2007) 798-800.
- F. D. Aaron et al. [H1 Collaboration], "Measurement of Deeply Virtual Compton Scattering and its t -dependence at HERA," *Phys. Lett. B* **659** (2008), 796-806
- F. D. Aaron et al. [H1 Collaboration], "Diffractive electroproduction of ρ and ϕ mesons at HERA", *JHEP* **1005** (2010), 032
- A. Astvatsatourov, K. Cerny, J. Delvax, L. Favart, T. Hreus, X. Janssen, R. Roosen and T. Sykora, P. Van Mechelen, "The H1 very forward proton spectrometer at HERA", *Nucl. Instrum. Methods A* **736** (2014), 46-65
- V. Andreev et al. [H1 Collaboration], "Diffractive Dijet Production with a Leading Proton in ep Collisions at HERA", *JHEP* **1505** (2015), 056 [arXiv:1502.01683].
- Khachatryan, Vardanyan, et al. [CMS Collaboration], "Measurements of differential production cross sections for a Z boson in association with jets in pp collisions at $\sqrt{s} = 8$ TeV", *JHEP* **04** (2017), 022 [arXiv:1611.03844].
- L. Favart, M. Guidal, T. Horn and P. Kroll, "Deeply Virtual Meson Production on the nucleon", *Eur. Phys. J. A* (2016) 52:158 arXiv:1511.04535 [hep-ph].
- [CMS Collaboration], "Measurement of differential cross sections for Z boson production in association with jets in proton-proton collisions at $\sqrt{s} = 13$ TeV", *Eur. Phys. J. C* **78** (2018), 965 arXiv:1804.05252 [hep-ex].
- [CMS Collaboration], "Measurement of exclusive $\rho^0(770)$ photoproduction in ultraperipheral pPb collisions at $\sqrt{s_{NN}} = 5.02$ TeV", *Eur. Phys. J. C* **79** (2019) 702, arXiv:1902.01339 [hep-ex].
- J. D'Hondt, L. Favart and F. Maltoni, "Research activities in Fundamental Interactions, from Elementary Particles to Cosmology, in Belgium", in the BNCPAP serie - Royal Academies for Science and the Arts of Belgium BPhy (2019) - BPhy Magazine 2019.

- Abdulov, N. A. et al., "TMDlib2 and TMDplotter: a platform for 3D hadron structure studies", *Eur. Phys. J. C* **81** (2021), 752, arXiv:2103.09741 [hep-ph]
- CMS Coll., "Measurement of differential cross sections for the production of a Z boson in association with jets in proton-proton collisions at $\sqrt{s} = 13$ TeV", CMS PAS SMP-19-009, arXiv:2205.02872 [hep-ex], *Phys. Rev. D* **108** (2023), 052004
- CMS Coll., "Measurement of the mass dependence of the transverse momentum of lepton pairs in Drell-Yan production in proton-proton collisions at $\sqrt{s} = 13$ TeV", CMS PAS SMP-20-003, *Eur. Phys. J. C* **83** (2023), 628, arXiv:2205.04897 [hep-ex]
- I. Bujanja, A. Bermudez Martinez, L. Favart et al., "The small kt-region in Drell-Yan production at next-to-leading order with the Parton Branching Method", *Eur. Phys. J. C* **84** (2024), 154 arXiv:2312.08655 [hep-ph].

Oral Communications

Among the 45 oral communications at conferences and seminars, the most representative are :

- "Diffractive Physics at HERA", review talk at the "International Nuclear Physics Conference 1998 (INPC98)", 24–28 Augustus 1998, UNESCO, Paris, France.
- "Deeply Inelastic Compton Scattering at HERA", XXXth International Conference on High Energy Physics (ICHEP 2000), Osaka, Japan, 27 July -2 Augustus 2000.
- "Inelastic scattering and diffraction at high energy - HERA results", lecture for the "European Graduate School Basel-Tübingen", Universität Tübingen, 14 May 2004.
- "Experimental review of diffractive phenomena", invited plenary talk at the 10th International Baryons Conference (BARYONS 2004), Paris, 25-29 October 2004.
- "Diffraction and Vector Mesons: Session Summary", WG session summary talk at the 15th International workshop on Deep-Inelastic Scattering (DIS 2007), Munich (D), 16-20 April 2007.
- "Inclusive diffraction and a measurement of the diffractive longitudinal structure function F_L^D at HERA", 2009 Europhysics Conference on High Energy Physics Search (EPS HEP-09), Cracovie, Pologne, 16-22 July 2009.
- "Physics at Accelerators", RECFA - open session, Brussels, 5 March 2010.
- "Exclusive electroproduction of vector mesons", 14th Workshop on Elastic and Diffractive Scattering (EDS Blois Workshop), Quy Nhon, Vietnam - 15-21 December 2011.
- "Recent Results on Diffraction at HERA", Workshop on Multi-Parton Interactions at the LHC (MPI@LHC 2013), Antwerp, Belgium, 2-6 December 2013
- "Parton Distribution Functions and Low x Physics", lecture at the "Joint Belgian Dutch German Graduate School (BND 2014)", Rolduc Abbey, Kerkrade (NL), 27-28 September 2014.
- "Recent HERA results on hard diffraction", LISHEP 2015 conference, Manaus (Brazil), 2-9 Augustus 2015.
- "Low- x and Diffraction", invited plenary talk, 24th International workshop on Deep-Inelastic Scattering (DIS 2016) Hamburg (D), 11-15 April 2016.
- Workshop on Resummation, Evolution, Factorization (REF), member of the scientific committee since 2016 and of the local organisation committee on 7-10 November 2016 Antwerp (B) and 31 October - 4 November 2022 Montenegro virtual meeting.
- "Belgium HEP Overview", RECFA - open session, Brussels, 21 April 2017.
- "High Energy Physics in Belgium", ESS Science Seminar in Belgium, Brussels, 14 September 2017.
- "Perturbative and colorful lectures on Strong Interactions" lecture (6h) at the "Joint Belgian Dutch German Graduate School (BND 2022)", Callantsoog (NL), 5-16 September 2022.
- "Measurement of the Drell-Yan transverse momentum dependence over a wide mass range at 13 TeV", LHC-EW WG General Meeting, CERN (CH), 15-17 November 2022