Curriculum Vitæ of Hugo DUMINIL-COPIN

French. Born on August 26, 1985.

Dpt de Mathématiques, Université de Genève
7-9, rue du conseil général, 1205 Genève, Suisse

Institut des Hautes Études Scientifiques
35, route de Chartres, 91440 Bures-sur-Yvette, France

Current Position

Since 2014 Full professor, Université de Genève.
Since 2016 Permanent Professor, Institut des Hautes Études Scientifiques (IHÉS).

Past Employments and Education

2013 – 2014 Assistant Professor, Université de Genève.
2008 – 2012 PhD & Postdoc, Université de Genève (supervised by S. Smirnov).
2006 – 2008 École Normale Supérieure de Paris. Agrégation de mathématiques.
2006 – 2007 Master, Université Paris XI.
2003 – 2005 MPSI and MP* (preparatories classes), Lycée Louis-Le-Grand, Paris.

Distinctions

2022 Fields medal.
2019 Dobrushin prize.
2019 Member of Academia Europaea.
2018 Invited speaker (session Probability and session Mathematical Physics), ICM Rio.
2017 Loeve Prize.
2017 Grand Prix Jacques Herbrand de l'Académie des Sciences.
2017 New Horizons Prize in Mathematics.

2016 Prize of the European Mathematical Society.
2015 Early Career Award of the International Association of Mathematical Physics.
2015 Cours Peccot du Collège de France.
2013 Oberwolfach Prize.
2012 Rollo Davidson Prize (joint with V. Beffara).
2012 Vacheron-Constantin Prize.

Selected lectures

Named lecture series. ICTS Ramanujan lectures (2023), Princeton Minerva Distinguished Lecture series (2019), Takagi lectures (2017), Charles River Lectures (2016), Current Developments in Mathematics (2015).

Plenary lectures in conferences. Jahrestagung of Deutsche Mathematiker-Vereinigung (2022), Portuguese Mathematical Society 80th birthday meeting (2021), International Congress of Mathematical Physics (2021), IMS Medallion Lecture SPA conference (2021), German Probability and Stochastic days (2020), Brazil-France Congress (2019), 150 years of the Finnish Mathematical Society (2018), Congrès de la société mathématique de France (2018), Brazilian Colloquio (2017), Early Career Award Lecture International Congress of Mathematical Physics (2015), Stochastic Processes and Applications (2013).

Lecture series in schools. YRS (2021), Bath summer school (2020), Clay summer school (2020), Saint-Flour summer school (2018), IST summer school in Mathematical physics (2018), Spin Systems: Discrete and Continuous (2018), Brazilian probability school (2017), PIMS summer school in Probability (2017), Universality, Scaling Limits and Effective Theories (2016).

PhD and Postdoctoral Students

Current. Piet Lammers (postdoc), Christoforos Panagiotis (postdoc), Trishen Gunaratman (postdoc), Romain Panis (Phd), Matthias Kloeckner (Phd), Dmitry Krachun (Phd), Mendes Oulamara (Phd).

Past. Franco Severo (postdoc at ETH), Alex Karrila (Lecturer Abo Akademi University), Pierre-François Rodriguez (lecturer at Imperial College London), Subhajit Goswami (reader at Tata Institute of Fundamental Research of Mumbai), Giovanni Antinucci (work in private sector), Daria Smirnova (work in private system), Jhih-Huang Li (assistant professor at National Taiwan University), Aran Raoufi (work in private sector), Matan Harel (Assistant Professor Northeastern University), Ioan Manolescu (Professor at the University of Fribourg), Vincent Tassion (Associate Professor at ETH).

Editorial board

Probability and Mathematical Physics (main editor)
Duke Mathematical Journal
Publications of IHES
Inventiones Mathematicae
Communications in Mathematical Physics (2016–2020)
Annals of Probability (2016–2021)
Annales de l'Institut Henri Poincaré (B) Probabilités et Statistiques (2015-2021)
EMS Monographs in Mathematics

Selected publications

1 **Planar random-cluster model: scaling relations**
   with I. Manolescu, *Forum of Mathematics, Pi*, 10, E23, 83 pages.

2 **Marginal triviality of the scaling limits of critical 4D Ising and φ_4^4 models**
   with M. Aizenman, *Annals of Mathematics*, 194(1), 163–235, 2021.

3 **Discontinuity of the phase transition for the planar random-cluster and Potts models with $q > 4$**
   with M. Gagnebin, M. Harel, I. Manolescu and V. Tassion, *Annales de l'École Normale Supérieure*, 54(4), 1363-1413, 2021.

4 **Sharp phase transition for the random-cluster and Potts models via decision trees**
   with A. Raoufi and V. Tassion, *Annals of Mathematics*, **189(1)**, 74–99, 2019.

5 **Continuity of the phase transition for planar random-cluster and Potts models with $1 \leq q \leq 4$**
   with V. Sidoravicius and V. Tassion, *Communications in Mathematical Physics*, **349(1)**, 47-107, 2017.

6 **A new proof of the sharpness of the phase transition for Bernoulli percolation and the Ising model**
   with V. Tassion, *Communications in Mathematical Physics*, **343(2)**, 725–745, 2016.

7 **Random Currents and Continuity of Ising Model's Spontaneous Magnetization**
   with M. Aizenman and V. Sidoravicius, *Communications in Mathematical Physics*, **334**, 719–742, 2015.

8 **The self-dual point of the two-dimensional random-cluster model is critical for $q \geq 1$**
   with V. Beffara, *Probability Theory and Related Fields*, **153(3)**, 511–542, 2012.

9 **The connective constant of the honeycomb lattice equals $\sqrt{2 + \sqrt{2}}$**
   with S. Smirnov, *Annals of Mathematics*, **175(3)**, 1653–1665, 2012.

10 **The sharp threshold for bootstrap percolation in all dimensions**
   with J. Balogh, B. Bollobás and R. Morris, *Transaction of the American Mathematical Society*, **364**, 2667–2701, 2012.

Other published and in press articles

11 **Existence of an unbounded nodal hypersurface for smooth Gaussian fields in dimension $d \geq 3$**
   with A. Rivera, P.F. Rodriguez, and H. Vanneuville, *Annals of Probability*, 51(1), 228–276, 2023.

12 **Equality of critical parameters for percolation of Gaussian free field level-sets**
   with S. Goswami, P.-F. Rodriguez, and F. Severo, *to appear in Duke Mathematical Journal, arXiv:2002.07735* (54 pages).

13 **Planar random-cluster model: fractal properties of the critical phase**
   with I. Manolescu and V. Tassion, *Probability Theory and Related Fields*, 181, 401–449, 2021.

14 **Renormalization of crossing probabilities in the planar random-cluster model**
   with V. Tassion, *Moscow Mathematical journal*, 20(4), 711–740, 2020.

15 **Existence of phase transition for percolation using the Gaussian Free Field**
with S. Goswami, A. Raoufi, F. Severo and A. Yadin, *Duke mathematical journal*, 169(18), 3539–3563.

16 **Upper bounds on the percolation correlation length**
with G. Kozma and V. Tassion, *In and out of equilibrium 3. Celebrating Vladas Sidoravicius*, 77, 347–369, 2021.

17 **Macroscopic loops in the loop $O(n)$ model at Nienhuis' critical point**
with A. Glazman, R. Peled and Y. Spinka, *Journal of European Mathematical Society*, 23(1), 315–347, 2020.

18 **Universality of two-dimensional critical cellular automata**
with B. Bollobás, R. Morris and P. Smith, *to appear in Proceedings of the London Mathematical Society*, *arXiv:1406.6680* (69 pages).

19 **Subcritical phase of d-dimensional Poisson-Boolean percolation and its vacant set**
with A. Raoufi and V. Tassion, *Annales Henri Lebesgue*, 3, 677–700, 2020.

20 **Dimerization and Néel order in different quantum spin chains through a shared loop representation**
with M. Aizenman and S. Warzel, *Annales Henri Poincaré D*, 21, 2737–2774, 2020.

21 **On the number of maximal paths in directed last-passage percolation**
with Harry Kesten, Fedor Nazarov, Yuval Peres and Vladas Sidoravicius, *Annals of Probability*, 48(5), 2176–2188, 2020.

22 **Exponential decay of truncated correlations for the Ising model in any dimension for all but the critical temperature**
with S. Goswami and A. Raoufi, *Communications in Mathematical Physics*, **374(2)**, 891–921, 2020.

23 **Bounding the number of self-avoiding walks: Hammersley-Welsh with polygon insertion**
with S. Ganguly, A. Hammond and I. Manolescu, *Annals of Probability*, 48(4), 1644–1692, 2020.

24 **A note on Schramm's locality conjecture for random-cluster models**
with V. Tassion, *Sojourns in Probability and Statistical Physics II*, 123–134, 2019.

25 **Emergent Planarity in two-dimensional Ising Models with finite-range Interactions**
with Michael Aizenman, Vincent Tassion and Simone Warzel, *Inventiones Mathematicae*, **216(3)**, 661–743, 2019.

26 **On the double random current nesting field**
with Marcin Lis, *Probability Theory and Related Fields*, 175(3–4), 937–955, 2019.

27 **Exponential decay of connection probabilities for subcritical Voronoi percolation in $\mathbb{R}^d$**
with A. Raoufi and V. Tassion, *Probability Theory and Related Fields*, 173(1–2), 479–490, 2019.

28 **Minimal growth harmonic functions on lamplighter groups**
with I. Benjamini, G. Kozma and A. Yadin, *New York Journal of Mathematics*, **23**, 833–858, 2017.

29 **The Internal Diffusion Limited Aggregation model with random starting point**
with I. Benjamini, G. Kozma and C. Lucas, *Annales de l'Inst. H. Poincaré Probab. Statist.*, 56(1), 391–404, 2020.

30 **Higher order corrections for anisotropic bootstrap percolation**
with A. C. D. van Enter and T. Hulshof, *Probability Theory and Related Fields*, **172(1–2)**, 191–243, 2018.

31 **The box-crossing property for critical two-dimensional oriented percolation**
with V. Tassion and A. Teixeira, *Probability Theory and Related Fields*, **171(3–4)**, 685–708, 2018.

32 **Brochette percolation**
with M. Hilario, G. Kozma and V. Sidoravicius, *Israel Journal of Mathematics*, **225(1)**, 479–501, 2018.

33 **A new computation of the critical point for the planar random-cluster model with $q \geq 1$**
with A. Raoufi and V. Tassion, *Annales de l'IHP*, **54(1)**, 422–436, 2018.

34 **The sharp threshold for the Duarte model**
with B. Bollobás, R. Morris and P. Smith, *Annals of Probability*, **45(6B)**, 4222–4272, 2017.

35 **Universality for the random-cluster model on isoradial graphs**
with J.-H. Li and I. Manolescu, *Electronic Journal of Probability*, **23(96)**, 1–70, 2018.

36 **A new proof of the sharpness of the phase transition for Bernoulli percolation on $\mathbb{Z}^{\mathbf{d}}$**
with V. Tassion, *Enseignement Mathématique*, **62(1/2)**, 199–206, 2016.

37 **Conformal invariance of crossing probabilities for the Ising model with free boundary conditions**
with C. Hongler and S. Benoist, *Annales de l'Institut Henri Poincaré*, **52(4)**, 1784–1798, 2016.

38 **Exponential decay of loop lengths in the loop O(n) model with large n**
with R. Peled, W. Samotij and Y. Spinka, *Communications in Mathematical Physics*, **349(3)**, 777–817, 2017.

39 **A quantitative Burton-Keane estimate under strong FKG condition**
with D. Ioffe and Y. Velenik, *Annals of Probability*, **44(5)**, 3335–3356, 2016.

40 **On the critical parameters of the q > 4 random-cluster model on isoradial graphs**
with V. Beffara and S. Smirnov, *Journal of Physics A: Mathematical and Theoretical*, **48(48)**, 484003, 2015.

41 **The phase transitions of the planar random-cluster and Potts models with q ≥ 1 are sharp**
with I. Manolescu, *Probability Theory and Related Fields*, **164(3)**, 865–892, 2016.

42 **On the probability that self-avoiding walks ends at a given point**
with A. Glazman, A. Hammond and I. Manolescu, *Annals of Probability*, **44(2)**, 955–983, 2016.

43 **Absence of infinite cluster for critical Bernoulli percolation on slabs**
with V. Sidoravicius and V. Tassion, *Communications in Pure and Applied Math*, **69(7)**, 1397–1411, 2016.

44 **Crossing probabilities in topological rectangles for the critical planar FK-Ising model**
with D. Chelkak and C. Hongler, *Electronic Journal of Probability*, **21(1)**, 1–28, 2016.

45 **Disorder, entropy and harmonic functions**
with I. Benjamini, G. Kozma and A. Yadin, *Annals of Probability*, **43(5)**, 2332–2373, 2015.

46 **The critical fugacity for surface adsorption of self-avoiding walks on the honeycomb lattice is $1 + \sqrt{2}$**
with N. Beaton, M. Bousquet-Mélou, J. De Gier and A. Guttmann, *Communications in Mathematical Physics*, **326(3)**, 727–754, March 2014.

(*Gavin Brown Prize from the Australian Mathematical Society 2018*).

47 **The near-critical planar FK-Ising model**
with C. Garban and G. Pete, *Communications in Mathematical Physics*, **326**, 1–35, 2014.

48 **Supercritical self-avoiding walks are space-filling**
with G. Kozma and A. Yadin, *Annales de l'Institut Henri Poincaré* , **50(2)**, 315–326, 2014.

49 **Seven-dimensional forest fires**
with D. Ahlberg, G. Kozma and V. Sidoravicius, *Annales de l'Institut Henri Poincaré* , **51(3)**, 862–866, 2015.

50 **Convergence of Ising interfaces to Schramm's SLE curves**
with D. Chelkak, C. Hongler, A. Kemppainen and S. Smirnov, *Comptes Rendus Mathematiques*, **352(2)**, 157–161, 2014.

51 **On the Gibbs states of the noncritical Potts model on $\mathbb{Z}^2$**
with L. Coquille, D. Ioffe and Y. Velenik, *Probability Theory and Related Fields* **158(1–2)**, 477–512, 2014.

52 **Limit of the Wulff Crystal when approaching criticality for site percolation on the triangular lattice**
Electronic Communications in Probability, **18(93)**, 1–9, 2013.

53 **Self-avoiding walk is sub-ballistic**
with A. Hammond, *Communications in Mathematical Physics*, **324(2)**, 401–423, 2013.

54 **The critical temperature for the Ising model on planar doubly periodic graphs**
with D. Cimasoni, *Electronic Journal of Probability*, **18(44)**, 1–18, 2013.

55 **Containing Internal Diffusion Limited Aggregation**
with C. Lucas, A. Yadin and A. Yehudayoff, *Electronic Communications in Probability*, **18(50)**, 1–8, 2013.

56 **Sharp metastability threshold for an anisotropic bootstrap percolation model**
with A. C. D. Van Enter, *Annals of Probability*, **41(3A)**, 1218–1242, 2013.

57 **Divergence of the correlation length for critical planar FK percolation with $1 \leq q \leq 4$ via parafermionic observables**
Journal of Physics A: Mathematical and Theoretical, **45** 494013, 26 pages, 2012.

58 **Smirnov's fermionic observable away from criticality**
with V. Beffara, *Annals of Probability*, **40(6)**, 2667–2689, 2012.

59 **Connection probabilities and RSW-type bounds for the FK Ising model**
with C. Hongler and P. Nolin, *Communications in Pure and Applied Mathematics*, **64(9)**, 1165–1198, 2011.

60 **Bridge decomposition of Restriction Measures**
with T. Alberts, *Journal of Statistical Physics*, **140**, 467–493, 2010.

Preprints and submitted papers

61 **Near critical scaling relations for planar Bernoulli percolation without differential inequalities**
with I. Manolescu and V. Tassion, *arXiv:2111.14414*, (19 pages).

62 **Conformal invariance of double random currents I: identification of the limit**
with M. Lis and W. Qian, *arXiv:2107.12985* (101 pages).

63 **Conformal invariance of double random currents II: tightness and properties in the discrete**
with M. Lis and W. Qian, *arXiv:2107.12880* (75 pages).

64 Rotational invariance in critical planar lattice models
with K.K. Kozlowski, D. Krachun, I. Manolescu, and M. Oulamara, *arXiv:2012.11672* (92 pages).

65 Delocalization of the height function of the six-vertex model
with A. Karrila, I. Manolescu, and M. Oulamara, *arXiv:2012.13750* (54 pages).

66 On the six-vertex model's free energy
with K.K. Kozlowski, D. Krachun, I. Manolescu, and T. Tikhonovskaia, *arXiv:2012.11675* (52 pages).

67 Long-range order for critical Book-Ising and Book-percolation
with C. Garban and V. Tassion, *arXiv:2011.04644* (28 pages).

68 Long-range models in 1D revisited
with C. Garban and V. Tassion, *arXiv:2011.04642* (8 pages).

69 Logarithmic variance for the height function of square-ice
with M. Harel, B. Laslier, A. Raoufi, and G. Ray, *arXiv:1911.00092* (29 pages).

Books, Surveys, and Lecture notes

70 Lectures on the Ising and Potts models on the hypercubic lattice.
Lecture notes of the 2017 PIMS-CRM summer school in Probability, Random Graphs, Phase Transitions, and the Gaussian Free Field, PIMS-CRM Summer School in Probability (102 pages).

71 Graphical representations of lattice spin models
Lecture notes of Cours Peccot du Collège de France, Édition Spartacus (105 pages).

72 Parafermionic observables and their applications to planar statistical physics models
Ensaios Matematicos, Brazilian Mathematical Society, **25** (371 pages).

73 Lectures on self-avoiding walks
with R. Bauerschmidt, J. Goodman, and G. Slade, *Lecture notes in Probability and Statistical Physics in Two and More Dimensions, Editors David Ellwood, Charles Newman, Vladas Sidoravicius, Wendelin Werner, published by CMI/AMS – Clay Mathematics Institute Proceedings* (74 pages).

74 The Bethe ansatz for the six-vertex and XXZ models: an exposition
with M. Gagnebin, M. Harel, I. Manolescu and V. Tassion, *Probability Surveys*, **15**, 102 - 130, 2018.

75 Conformal invariance in lattice models
with S. Smirnov, *Lecture notes in Probability and Statistical Physics in Two and More Dimensions, Editors David Ellwood, Charles Newman, Vladas Sidoravicius, Wendelin Werner, published by CMI/AMS – Clay Mathematics Institute Proceedings.* (82 pages).

76 Critical point in planar lattice models
with V. Beffara, *Probability and Statistical Physics in St. Petersburg, Editors Vladas Sidoravicius and Stanislav Smirnov, Proceedings of Symposia in Pure Mathematics, published by AMS*, **91**, 2016.

77 Planar percolation with a glimpse of Schramm-Loewner Evolution
with V. Beffara, *Probability surveys*, **10(0)**, 1–50, 2013.

78 Introduction to percolation theory
Unofficial lecture notes for a master class given in Orsay, 2017.

Other publications

79 **100 Years of the (Critical) Ising Model on the Hypercubic Lattice**
Proceedings of the ICM 2022, arXiv:2208.00864.

80 **Counting self-avoiding walks on the hexagonal lattice**
Snapshots of modern mathematics from Oberwolfach, June 2019.

81 **Sharp threshold phenomena in statistical physics**
Proceedings of the Takagi Lectures 2017, 2018, arXiv:1810.03384.

82 **Sixty years of percolation**
Proceedings of the ICM 2018, Rio, 2018, arXiv:1712.04651.

83 **Random currents expansion of the Ising model**
Proceedings of the 7th European Congress of Mathematicians in Berlin, 2016.

84 **A proof of first order phase transition for the planar random-cluster and Potts models with** $q \gg 1$ *Proceedings of Stochastic Analysis on Large Scale Interacting Systems in RIMS kokyuroku Besssatu*, 2016.

85 **Parafermionic observables and their applications**
IAMP bulletin, January 2016.

86 **RSW and Box-Crossing Property for Planar Percolation**
with V. Tassion, *Proceedings of the International Congress of Mathematical Physics*, 2015.

87 **Order/disorder phase transitions: the example of the Potts model**
Proceedings of the conference Current Developments in Mathematics, Vol. 1, 27-71, 2015.

88 **Phase transition in planar random-cluster and O(n) models**
PhD thesis (356 pages).

89 **Law of the iterated logarithm for the random walk on the infinite percolation cluster**
master thesis (10 pages).

90 **La percolation, un jeu de pavages aléatoires**
Pour la Science, **407**, September 2011, in french.

91 **Tests de Primalité : "Prime is in P"**
Revue de la filière mathématiques RMS, **4**, Mai 2006, in french.