

## Dunlop François

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1950 born in Bellshill (Scotland), French and British citizen

1969–1973 Ecole Normale Supérieure (Paris).

1973–1974 Princeton University, H.W. Dodds fellow.

1974–1979 Institut des Hautes Etudes Scientifiques (Bures-sur-Yvette).

1979 Doctorat ès Sciences: “Zéros des fonctions de partition et inégalités de corrélation pour des modèles de spins classiques”, Université Paris 7.

1979–1994 Centre de Physique Théorique, Ecole Polytechnique (Palaiseau).

1975–1994 CNRS researcher (IHES and Ecole Polytechnique).

1994 – . . . Professor, Université de Cergy-Pontoise, Theoretical Physics and Modelling Laboratory

*Research fields:* mathematical and statistical physics

*Keywords:* Random walk, Solid-On-Solid model, Wetting, Layering, Contact angle hysteresis, Metastability.

*Coordination of research projects/conferences:* 1993-1997 coordinator for European network (Stochastic dynamics and statistical mechanics of interfaces); 2005 co-director of Les Houches summer school (Mathematical Statistical Physics); 1994 – . . . (with Th. Gobron and E. Saada) Inhomogeneous Random Systems, Institut Henri Poincaré.

*Editor (associate):* Markov Processes and Related Fields

*5 Selected publications:*

– F. Dunlop, C.M. Newman: Multicomponent Field Theories and Classical Rotators, Commun. Math. Phys. 44, 223-235 (1975).

– P. Devillard, F. Dunlop, B. Souillard: Localization of Gravity Waves on a Channel with a Random Bottom, J. Fluid Mechanics 186, 521-538 (1988).

– P. Collet, J. De Coninck, F. Dunlop, A. Regnard: Dynamics of the contact line: contact angle hysteresis, Phys. Rev. Lett. 79, 3704-3707 (1997).

– J. De Coninck, F. Dunlop, Th. Huillet: Random walk weakly attracted to a wall, J. Stat. Phys. 133, 271-280 (2008):

A random walk over the positive integers with a bias inversely proportional to the distance to the origin drifts away in average with a non-universal scaling exponent as a function of the number of steps. This is related to a model of wetting in a potential going to zero at infinity as the inverse squared distance to the origin (Physica A 2009).

– K.S. Alexander, F. Dunlop, S. Miracle-Solé: Layering in the Ising model, J. Stat. Phys., 141, 217-241 (2010):

The phase diagram of the Ising model in  $\mathbb{Z}_+^3$  remains an open problem in mathematical physics: the delocalization of the interface at a temperature  $T_W < T_c$ , demonstrated by Cahn using critical exponents, awaits a mathematical proof, and the path to this wetting transition is very partially known from numerical work. Using a 2-scale low-temperature expansion, we exhibit an infinity of layering transition lines, and prove convergence in the SOS-model approximation.

## Publications

<http://dunlop.u-cergy.fr/publi.html>

1. F. Dunlop, C.M. Newman: *Multicomponent Field Theories and Classical Rotators*, Commun. Math. Phys. **44**, 223–235 (1975).
2. F. Dunlop: *Correlation Inequalities for Multicomponent Rotators*, Commun. Math. Phys. **49**, 247–256 (1976).
3. F. Dunlop: *Zeros of Partition Functions via Correlation Inequalities*, J. Stat. Phys. **17**, 215–228 (1977).
4. F. Dunlop: *Zeros of the Partition Function and Gaussian Inequalities for the Plane Rotator Model*, J. Stat. Phys. **21**, 561–572 (1979).
5. F. Dunlop: *Analyticity of the Pressure for Heisenberg and Plane Rotator Models*, Commun. Math. Phys. **69**, 81–88 (1979).
6. M. Combesure, F. Dunlop: *n-Particle Irreducible Functions in Euclidean Quantum Field Theory*, Ann. Phys. **122**, 102–150 (1979).
7. M. Combesure, F. Dunlop: *Three Body Asymptotic Completeness for  $P(\phi)_2$  Models*, Commun. Math. Phys. **85**, 381–418 (1982).
8. J. De Coninck, F. Dunlop: *Fluctuation Susceptibility Relations for Classical Spin Systems*, J. Stat. Phys. **40**, 241–248 (1985).
9. F. Dunlop: *Correlation Inequalities and the Kosterlitz Thouless Transition for Anisotropic Rotators*, J. Stat. Phys. **41**, 733–743 (1985).
10. M. Belzons, P. Devillard, F. Dunlop, E. Guazzelli, O. Parodi, B. Souillard: *Localization of Surface Waves on a Rough Bottom: Theories and Experiments*, Europhys. Lett. **4**, 909–914 (1987).
11. P. Collet, F. Dunlop: *Geometric Expansion of the Boundary Free Energy of a Dilute Gas*, Commun. Math. Phys. **108**, 1–12 (1987).
12. J. De Coninck, F. Dunlop: *Partial to Complete Wetting: A Microscopic Derivation of the Young Relation*, J. Stat. Phys. **47**, 827–849 (1987).
13. J. De Coninck, F. Dunlop: *Wetting Transitions and Contact Angles*, Europhys. Lett. **4**, 1291–1296 (1987).
14. F. Dunlop, J. Ruiz: *Non Crossing Walks and Interfacial Wetting*, Ann. Inst. Henri Poincaré **48**, 229–251 (1988).
15. P. Devillard, F. Dunlop, B. Souillard: *Localization of Gravity Waves on a Channel with a Random Bottom*, J. Fluid Mechanics **186**, 521–538 (1988).
16. D.B. Abraham, J. De Coninck, F. Dunlop: *Contact angle for two-dimensional Ising ferromagnets*, Phys. Rev. **B39**, 4708–4710 (1989).
17. J. De Coninck, F. Dunlop, V. Rivasseau: *On the Microscopic Validity of the Wulff Construction and of the Generalized Young Equation*, Commun. Math. Phys. **121**, 401–419 (1989).
18. F. Dunlop, L. Laanait, A. Messager, S. Miracle-Solé, J. Ruiz: *Multilayer Wetting in Partially Symmetric q-State Models*, J. Stat. Phys. **59**, 1383–1396 (1990).
19. K. Berlier, J. De Coninck, F. Dunlop, F. Menu: *Multilayer Wetting in Clock Models*, J. Stat. Phys. **61**, 179–186 (1990).
20. D.B. Abraham, P. Collet, J. De Coninck, F. Dunlop: *Langevin Dynamics of Spreading and Wetting*, Phys. Rev. Lett. **65**, 195–198 (1990).

21. D.B. Abraham, P. Collet, J. De Coninck, F. Dunlop: *Langevin Dynamics of an Interface near a Wall*, J. Stat. Phys. **61**, 509–532 (1990).
22. J. De Coninck, F. Dunlop, F. Menu: *Exact Results for a Meniscus in a Three-Phase System Within an SOS-Type Approximation*, J. Stat. Phys. **61**, 1121–1139 (1990).
23. D.B. Abraham, P. Collet, J. De Coninck, F. Dunlop, J. Heiniö, K. Kaski and L.F. Ko: *Theory of Wetting and Spreading*, Physica A **172**, 125–136 (1991).
24. M. Duneau, F. Dunlop, A. Jagannathan, C. Oguey: *Frustrated Ising Models on Quasiperiodic Lattices in Two Dimensions*, Modern Physics Letters B **5**, 1895–1903 (1991).
25. F. Dunlop, J. Magnen, V. Rivasseau, Ph. Roche: *Pinning of an Interface by a Weak Potential*, J. Stat. Phys. **66**, 71–98 (1992).
26. F. Dunlop, J. Magnen, V. Rivasseau: *Mass Generation for an Interface in the Mean Field Regime*, Ann. Inst. Henri Poincaré, **57**, 333–360 (1992).
27. J. De Coninck, F. Dunlop, F. Menu: *Spreading of a Solid-On-Solid Drop*, Phys. Rev. E **47**, 1820–1823 (1993).
28. M. Duneau, F. Dunlop, C. Oguey: *Ground States of Frustrated Ising Quasicrystals*, J. Phys. A: Math. Gen. **26**, 2791–2802 (1993).
29. P. Collet, J. De Coninck, F. Dunlop: *Dynamics of Wetting with a Disordered Substrate: the Contact Angle Hysteresis*, Europhys. Lett. **22**, 645–650 (1993).
30. P. Collet, J. De Coninck, F. Dunlop: *Contact Angle Hysteresis in a Solid-On-Solid Model*, J. Stat. Phys. **75**, 37–49 (1994).
31. F. Dunlop, J. Magnen, V. Rivasseau: *Mass Generation for an Interface in the Mean Field Regime: addendum*, Ann. Inst. Henri Poincaré, **61** 245–253 (1994).
32. P. Collet, F. Dunlop, T. Gobron: *Conservative Langevin Dynamics of Solid-On-Solid Interfaces*, J. Stat. Phys. **79**, 215–230 (1995).
33. P. Collet, F. Dunlop, D. Foster, T. Gobron: *Product Measures and Dynamics for Solid-On-Solid Interfaces*, J. Stat. Phys. **89**, 509–536 (1997).
34. P. Collet, J. De Coninck, F. Dunlop, A. Regnard: *Dynamics of the contact line: contact angle hysteresis*, Phys. Rev. Lett. **79**, 3704–3707 (1997).
35. P. Collet, F. Dunlop, J. Fritz, T. Gobron: *Langevin Dynamics of a Semi-infinite Interface*, Markov Processes Relat. Fields **3**, 261–274 (1997).
36. F. Dunlop, K. Topolski: *Cassie’s law and convexity of wall tension with respect to disorder*, J. Stat. Phys. **98**, 1115–1134 (2000).
37. F. Dunlop, P. A. Ferrari, L. R. G. Fontes: *A dynamic one-dimensional interface interacting with a wall*, J. Stat. Phys. **107**, 705–727 (2002).
38. F. Dunlop: *Stationary States and Scaling Shapes of One-Dimensional Interfaces*, J. Stat. Phys. **111**, 433–442 (2003).
39. F. Dunlop, Th. Huillet: *Hard rods: statistics of parking configurations.*, Physica A, **324**, 698–706 (2003).
40. J. De Coninck, F. Dunlop, T. Huillet: *A necklace of Wulff shapes*, J. Stat. Phys. **123**, 223–236 (2006).
41. J. De Coninck, F. Dunlop, T. Huillet: *Correlations of a bound interface over a random substrate*, Eur. Phys. J. **B 54**, 341–344 (2006).
42. J. De Coninck, F. Dunlop, T. Huillet: *On the correlation structure of some random point processes on the line*, Physica A **387**, 725–744 (2008).

43. J. De Coninck, F. Dunlop, T. Huillet: *Random walk weakly attracted to a wall*, J. Stat. Phys. **133**, 271–280 (2008).
44. J. De Coninck, F. Dunlop, Th. Huillet: *Random walk versus random line*, Physica A **388**, 4034–4040 (2009).
45. F. Dunlop: *Space-time correlations of a Gaussian interface*, Markov Processes Relat. Fields **16**, 205–222 (2010).
46. K.S. Alexander, F. Dunlop, S. Miracle-Solé: *Layering in the Ising model*, J. Stat. Phys. **141**, 217–241 (2010).
47. K.S. Alexander, F. Dunlop, S. Miracle-Solé: *Layering and wetting transitions for an SOS interface*, J. Stat. Phys. **142**, 524–577 (2011).
48. J. De Coninck, F. Dunlop, Th. Huillet: *Metastable wetting*, J. Stat. Mech. P06013 (2011).
49. P. Collet, J. De Coninck, K. Drouiche, F. Dunlop: *From Substrate Disorder to Contact Angle Hysteresis, and Back*, Colloid Polym. Sci. **291**, 291–298 (2013).
50. J. De Coninck, F. Dunlop, Th. Huillet: *Is superhydrophobicity robust with respect to disorder?*, Eur. Phys. J. E **36**, 104 (2013).
51. P. Collet, F. Dunlop, Th. Huillet: *Wetting transitions for a random line in long-range potential*, J. Stat. Phys. **160**, 1545-1622 (2015).
52. J. De Coninck, F. Dunlop, Th. Huillet: *Wetting in 1+1 dimensions with two-scale roughness*, Physica A **438**, 398-415 (2015).
53. J. De Coninck, F. Dunlop, Th. Huillet: *Contact angles of a drop pinned on an incline*, Phys. Rev. E **95**, 052805 (2017).
54. J. De Coninck, J-C. Fernandez Toledano, F. Dunlop, Th. Huillet: *Pinning of a drop by a junction on an incline*, Phys. Rev. E **96**, 042804 (2017).
55. L. De Maio, F. Dunlop: *Sessile drop on oscillating incline*, arXiv:1709.02124 [physics.flu-dyn]

**Proceedings:**

- A1. F. Dunlop: *Zeros of the Partition Function for some Generalized Ising Models*. pp 263-278 in Coll. Math. Soc. Janos Bolyai **27**: Random Fields, Esztergom (1979).
- A2. F. Dunlop: *Mass Generation for an Interface in a Bounded Potential*, pp 71–76 in “Phase Transitions: Mathematics, Physics, Biology,...”, Edited by R. Kotecky, World Scientific, Singapore (1993).
- A3. F. Dunlop, M. Plapp: *Scaling profiles of a spreading drop from Langevin or Monte-Carlo dynamics*, pp. 303–308 in “On Three Levels: Micro-, Meso-, and Macro-Approaches in Physics”, Edited by M. Fannes et al., Plenum Press, New-York (1994).
- A4. F. Dunlop: *Random and Interacting Surfaces*, pp 249–265 in “Constructive Physics: Results in Field Theory, Statistical Mechanics and Condensed Matter Physics”, V. Rivasseau ed., Springer-Verlag, Berlin Heidelberg (1995).
- A5. F. Dunlop, J. Magnen: *A Wulff Shape from Constructive Field Theory*, pp 31–52 in “Mathematical Results in Statistical Mechanics”, S. Miracle-Solé, J. Ruiz, V. Zagreb-nov eds., World Scientific (1999).