

CURRICULUM VITAE

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PHILIPPE GAUCHER

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PERSONAL DETAILS

Gender: He/Him
Date of birth: February 5th, 1967
Place of birth: Amiens, France
Present Citizenship: French

RESEARCH AREA

Homotopy theory and applications in computer science (concurrency theory)

The main geometric models I am interested in are several variants of Grandis' d-spaces (multipointed or not), trace spaces giving rise to semicategorical variants called flows, Moore variants or these notions, and several improvements of the notion of precubical set (non-symmetric and symmetric transverse set, partial precubical set).

EDUCATION

- 09/1984–06/1987 Undergraduate courses (L1, L2) to prepare nationwide competitive exams, Mathematics, Physics, Computer Science at the Classe Préparatoire du Lycée Corneille (Rouen, France)
- 10/1987–06/1988 Undergraduate and graduate studies (L3, M1) at the Ecole Normale Supérieure de la rue d'Ulm (Paris, France)
- 1988 L3 and M1 degrees in mathematics and computer science (Magistère Ecole Normale Supérieure de la rue d'Ulm et Université Paris 7 Denis-Diderot)
- Title: *A propos de l'homologie des algèbres de Lie*

- 09/1988–06/1989 Graduate studies (M2) at the Institut de Recherche Mathématique Avancée (Université Louis Pasteur, Strasbourg, France)
- 1989 M2 degree in pure mathematics (algebraic topology, Université Louis Pasteur, Strasbourg)
Supervisor: Daniel Guin
Title: *On the general linear group and Hochschild homology*
- 1992 Ph.D. degree in mathematics (algebraic topology, Université Louis Pasteur, Strasbourg)
Jury: Jean-Louis Loday (supervisor), Henri Carayol (rapporteur), Christophe Soulé (rapporteur), Daniel Guin, Hubert Rubenthaler
Title: *Opérations sur l'homologie d'algèbres de matrices et homologie cyclique*
- 2002 Habilitation degree in mathematics (algebraic topology and application in computer science, Université Louis Pasteur, Strasbourg)
Jury: Jean-Louis Loday (supervisor), Jeremy Gunawardena (rapporteur), Hans-Werner Henn (rapporteur), Michael Johnson (rapporteur), Pierre-Louis Curien, Jean-Yves Girard, Daniel Guin
Title: *Déformation des Flots de Chemins Continus : Théorie et Applications*
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EMPLOYMENT

- 10/1987–08/1991 Student at the Ecole Normale Supérieure de la rue d'Ulm (Paris)
- 09/1991–08/1992 Math Teacher at the Université Louis Pasteur (Strasbourg)
Allocataire Moniteur Normalien
- 09/1992–08/1993 Military service at the ONERA (Toulouse)
Supervisor: Gérard Eizenberg
- 09/1993–09/2003 CNRS researcher at the Institut de Recherche Mathématique Avancée (IRMA, Strasbourg)
- 10/2003–12/2015 CNRS researcher at Preuve Programme Système (PPS, Paris)
- 01/2016–Now CNRS researcher at the Institut de Recherche en Informatique Fondamentale (IRIF, Paris)
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ACADEMIC AWARDS

- 1984 Lauréat du Concours Général de Mathématiques

PROFESSIONAL SERVICE

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| 1989–1992 | Teaching (French: colleur en math sup) at the lycée Kleber de Strasbourg |
| 1994–1995 | Webmaster of IRMA Strasbourg |
| 2001–2002 | Teaching in L1 and L2 math (130 h, algebra, analysis, logic) |
| 2002–2003 | Teaching in L1 math and L3 geography (96 h, algebra, analysis) |
| 2003–2007 | Local coordinator for ANR project (INVAL) |
| 2006–Now | Reviewer for Math Reviews |
| 2007–Now | Reviewer for zbMATH |
| 2022–Now | Member of the Editorial Board of <i>Extracta Mathematicae</i> |
| 2003–Now | Reviewer for mathematical and computer-scientific journals (<i>Compositionality</i> , <i>Electronic Notes in Computer Science</i> , <i>Fundamenta Mathematicae</i> , <i>Mathematical Structures in Computer Science</i> , <i>New-York Journal of Mathematics</i> , <i>Springer Lecture Notes in Mathematics</i> , <i>Topology and Applications</i>) |
| 2003–Now | Project reviewer (NSERC Canada, Israel Science Foundation) |

PUBLICATIONS

- [1] P. Gaucher. Lambda-opérations et homologie des matrices. *C. R. Acad. Sci. Paris Sér. I Math.*, 313(10):663–666, 1991.
- [2] P. Gaucher. Produit tensoriel de matrices et homologie cyclique. *C. R. Acad. Sci. Paris Sér. I Math.*, 312(1):13–16, 1991.
- [3] P. Gaucher. Produit tensoriel de matrices, homologie cyclique, homologie des algèbres de Lie. *Ann. Inst. Fourier (Grenoble)*, 44(2):413–431, 1994. <https://doi.org/10.5802/aif.1404>.
- [4] P. Gaucher. Lambda-opérations sur l’homologie d’une algèbre de Lie de matrices. *K-Theory*, 13(2):151–167, 1998. <https://doi.org/10.1023/A:1007719230240>.
- [5] P. Gaucher. From concurrency to algebraic topology. In *Electronic Notes in Theoretical Computer Science*, volume 39, pages 1–19, 2000. [https://doi.org/10.1016/s1571-0661\(05\)01149-7](https://doi.org/10.1016/s1571-0661(05)01149-7).
- [6] P. Gaucher. Homotopy invariants of higher dimensional categories and concurrency in computer science. *Mathematical Structures in Computer Science*, 10(4):481–524, 2000. Geometry and concurrency. <https://doi.org/10.1017/S0960129500003182>.

- [7] P. Gaucher. Combinatorics of branchings in higher dimensional automata. *Theory Appl. Categ.*, 8:No. 12, 324–376 (electronic), 2001.
- [8] P. Gaucher. About the globular homology of higher dimensional automata. *Cah. Topol. Géom. Différ. Catég.*, 43(2):107–156, 2002.
- [9] P. Gaucher. Investigating the algebraic structure of dihomotopy types. In *Electronic Notes in Theoretical Computer Science*, volume 52, page 25pp. Elsevier Science Publishers, 2002. [https://doi.org/10.1016/S1571-0661\(04\)00221-X](https://doi.org/10.1016/S1571-0661(04)00221-X).
- [10] P. Gaucher. Automate parallèle à homotopie près. I. *C. R. Math. Acad. Sci. Paris*, 336(7):593–596, 2003. [https://doi.org/10.1016/S1631-073X\(03\)00118-3](https://doi.org/10.1016/S1631-073X(03)00118-3).
- [11] P. Gaucher. Automate parallèle à homotopie près. II. *C. R. Math. Acad. Sci. Paris*, 336(8):647–650, 2003. [https://doi.org/10.1016/S1631-073X\(03\)00119-5](https://doi.org/10.1016/S1631-073X(03)00119-5).
- [12] P. Gaucher. The branching nerve of HDA and the Kan condition. *Theory Appl. Categ.*, 11:No. 3, 75–106 (electronic), 2003.
- [13] P. Gaucher and E. Goubault. Topological deformation of higher dimensional automata. *Homology Homotopy Appl.*, 5(2):39–82, 2003. <https://doi.org/10.4310/HHA.2003.v5.n2.a3>.
- [14] P. Gaucher. A model category for the homotopy theory of concurrency. *Homology, Homotopy and Applications*, 5(1):p.549–599, 2003. <https://doi.org/10.4310/hha.2003.v5.n1.a20>.
- [15] P. Gaucher. The homotopy branching space of a flow. In *Electronic Notes in Theoretical Computer Science*, volume 100, pages 95–109. Elsevier Science Publishers, 2004. <https://doi.org/10.1016/j.entcs.2004.08.015>.
- [16] P. Gaucher. Comparing globular complex and flow. *New York J. Math.*, 11:97–150 (electronic), 2005.
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- [18] P. Gaucher. Homological properties of non-deterministic branchings of mergings in higher dimensional automata. *Homology Homotopy Appl.*, 7(1):51–76 (electronic), 2005. <https://doi.org/10.4310/hha.2005.v7.n1.a4>.
- [19] P. Gaucher. Inverting weak dihomotopy equivalence using homotopy continuous flow. *Theory Appl. Categ.*, 16:No. 3, 59–83 (electronic), 2006.
- [20] P. Gaucher. T-homotopy and refinement of observation (III) : Invariance of the branching and merging homologies. *New York J. Math.*, 12:319–348 (electronic), 2006.

- [21] P. Gaucher. T-homotopy and refinement of observation (IV) : Invariance of the underlying homotopy type. *New York J. Math.*, 12:63–95 (electronic), 2006.
- [22] P. Gaucher. T-homotopy and refinement of observation, part II: Adding new T-homotopy equivalences. *Internat. J. Math. Math. Sci.*, 2007:Article ID 87404, 20 pages, 2007. <https://doi.org/10.1155/2007/87404>.
- [23] P. Gaucher. Globular realization and cubical underlying homotopy type of time flow of process algebra. *New York J. Math.*, 14:101–137 (electronic), 2008.
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- [26] P. Gaucher. T-homotopy and refinement of observation (I) : Introduction. *Electronic Notes in Theoretical Computer Science*, 230:103–110, 2009. <http://dx.doi.org/10.1016/j.entcs.2009.02.019>.
- [27] P. Gaucher. Combinatorics of labelling in higher dimensional automata. *Theoretical Computer Science*, 411(11-13):1452–1483, 2010. <https://doi.org/10.1016/j.tcs.2009.11.013>.
- [28] P. Gaucher. Directed algebraic topology and higher dimensional transition systems. *New York J. Math.*, 16:409–461 (electronic), 2010.
- [29] P. Gaucher. Towards a homotopy theory of higher dimensional transition systems. *Theory Appl. Categ.*, 25:No. 25, 295–341 (electronic), 2011.
- [30] P. Gaucher. Erratum to ”towards a homotopy theory of higher dimensional transition systems”. *Theory Appl. Categ.*, 29:No. 2, 17–20 (electronic), 2014.
- [31] P. Gaucher. Homotopy theory of labelled symmetric precubical sets. *New York J. Math.*, 20:93–131 (electronic), 2014.
- [32] P. Gaucher. The choice of cofibrations of higher dimensional transition systems. *New York J. Math.*, 21:1117–1151 (electronic), 2015.
- [33] P. Gaucher. The geometry of cubical and regular transition systems. *Cah. Topol. Géom. Différ. Catég.*, LVI-4, 2015.
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- [36] P. Gaucher. Enriched diagrams of topological spaces over locally contractible enriched categories. *New York J. Math.*, 25:1485–1510 (electronic), 2019.
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- [45] P. Gaucher. Directed degeneracy maps for precubical sets. *Theory Appl. Categ.*, 41(7):194–237, 2024.

PREPRINTS

- [1] P. Gaucher. Natural homotopy of multipointed d-spaces, 2024. <https://doi.org/10.48550/arXiv.2404.18693>.
- [2] P. Gaucher. Homotopy theory of Moore flows (III), 2023. <https://doi.org/10.48550/arXiv.2303.16174>.
- [3] P. Gaucher. Towards a theory of natural directed paths, 2023. <https://doi.org/10.48550/arXiv.2306.02792>.

NON-PUBLISHED

- [1] P. Gaucher. Closed symmetric monoidal structure and flow. 2003. <https://doi.org/10.48550/arXiv.math/0308064>.
- [2] P. Gaucher. Homotopical equivalence of combinatorial and categorical semantics of process algebra. 2007. <https://doi.org/10.48550/arXiv:0711.1330>.

- [3] P. Gaucher. About transfinite compositions of weak equivalences of higher dimensional transition systems.
- [4] P. Gaucher. Erratum to “Homotopy theory of Moore flows I”, 2022. <https://doi.org/10.48550/arXiv.2207.01366>.