

PERSONAL INFORMATION

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Birth date: 1987.12.15

ACADEMIC POSITIONS

2014.09 – ... **Université Grenoble Alpes**, maître de conférences
(tenured associate professor)

2015.01 – 2015.04 **Stanford University**, visiting scholar

2013.10 – 2014.08 **Université Paris-Sud** (Orsay), post-doctoral researcher

2013.06 – 2013.09 **Universität Göttingen**, research assistant

EDUCATION

2010.05 – 2013.08 **Universität Göttingen**, PhD in mathematics; *thesis*:
“Singularities of two-point functions in Quantum Field Theory”
supervisor: Prof. Dorothea Bahns, 2nd supervisor: Prof. Ingo Witt

2005.10 – 2010.04 **University of Warsaw**, MSc in physics; *thesis*:
“Potentials leading to an exactly solvable Schrödinger equation”
supervisor: Prof. Jan Dereziński

FELLOWSHIPS, AWARDS

2018 Invited Researcher at Institut des Hautes Études Scientifiques,
Bures-sur-Yvette (10.09.18–10.10.18)

2018 Visiting Fellow, Wolfson College, Cambridge (15.06.18–30.08.18)

2017–2021 Prime d’Encadrement Doctoral et de Recherche (Award of the French Ministry of
Higher Education for excellent research and supervision)

2017 Délégation CNRS (one-semester sabbatical awarded by the CNRS)

2015 Fellowship of the France-Stanford Center for Interdisciplinary Studies

2015 “Research in Paris” Institut Henri Poincaré Fellowship

2013–2014 Sophie Germain Postdoctoral Fellowship, Hadamard Foundation (FMJH)

2010–2013 Doctoral scholarship of the Research Training Group 1493 *Mathematical
Structures in Modern Quantum Physics*, Göttingen

2010	Maria Bardadin-Otwinowska Prize
2009	Scholarship of the Polish Ministry of Science and Higher Education
2009	French Government Fellowship (for a one-month research stay)
2006–2008	University of Warsaw Scholarships for Academic Excellence

GRANTS, NETWORKS

2016–2019	Principal investigator in <i>ANR Jeunes Chercheuses/Jeunes Chercheurs</i> grant ANR-16-CE40-0012 (78 840 €) <i>Acronym:</i> Horizons <i>Full title:</i> “Scattering and propagation phenomena near spacetime horizons”
2017–2018	Co-principal investigator in project FK13_2017 funded by the French-Bavarian Center for Academic Cooperation (BFHZ/CCUFB)
2018	Member in French-Irish project 41020TA co-funded by PHC ULYSSES 2018 (PIs: C. Gérard & K. Sanders)
2018–2021	Member of GDR network “Renormalisation : Nouvelles Structures et Applications”, acronym RENORM
2017–2021	Member of GDR network “Analysis of Partial Differential Equations”, acronym EDP
2016–2020	Member of GDR network “Quantum Dynamics”, acronym DYNQUA

PUBLICATIONS & PREPRINTS

- [1] W. DYBALSKI, M. WROCHNA, A mechanism for holography for non-interacting fields on Anti-de Sitter spacetimes, [arXiv:1809.05123](#), (2018);
- [2] M. WROCHNA, Wick rotation in two variables on analytic backgrounds, [arXiv:1711.04011](#), (2018);
- [3] C. GÉRARD, M. WROCHNA, The massive Feynman propagator on asymptotically Minkowski spacetimes II, [arXiv:1806.05076](#), (2018);
- [4] M. WROCHNA, Conformal extension of the Bunch-Davies state across the de Sitter boundary, [arXiv:1711.04011](#), (2017);
- [5] M. WROCHNA, A. VASY, Quantum fields from global propagators on asymptotically Minkowski and extended de Sitter spacetimes, *Annales Henri Poincaré*, 19 (5), 1529-1586 (2018), [arXiv:1512.08052](#);
- [6] C. GÉRARD, M. WROCHNA, Analytic Hadamard states, Calderón projectors and Wick rotation near analytic Cauchy surfaces, [arXiv:1706.08942](#), (2017);
- [7] M. WROCHNA, The holographic Hadamard condition on asymptotically Anti-de Sitter spacetimes, *Letters in Mathematical Physics*, 107 (12), 2291-2331 (2017), [arXiv:1612.01203](#);

- [8] C. GÉRARD, M. WROCHNA, The massive Feynman propagator on asymptotically Minkowski spacetimes I, accepted in *American Journal of Mathematics*, (2016), arXiv:1609.00192;
- [9] C. GÉRARD, M. WROCHNA, Hadamard property of the *in* and *out* states for Klein-Gordon fields on asymptotically static spacetimes, *Annales Henri Poincaré*, 18 (8), 2715-2756 (2017), arXiv:1609.00190;
- [10] C. GÉRARD, O. OULGHAZI, M. WROCHNA, Hadamard states for the Klein-Gordon equation on Lorentzian manifolds of bounded geometry, *Communications in Mathematical Physics*, 352 (2), 519-583 (2017), arXiv:1602.00930;
- [11] M. WROCHNA, J. ZAHN, Classical phase space and Hadamard states in the BRST formalism for gauge field theories on curved spacetime, *Reviews in Mathematical Physics*, 29 (4), 1750004 (2017), arXiv:1407.8079;
- [12] C. GÉRARD, M. WROCHNA, Construction of Hadamard states by characteristic Cauchy problem, *Analysis & PDE*, 9 (1), (2016), arXiv:1409.6691;
- [13] C. GÉRARD, M. WROCHNA, Hadamard states for the linearized Yang-Mills equation on curved spacetimes, *Communications in Mathematical Physics*, 337 (1), (2015), arXiv:1403.7153;
- [14] C. GÉRARD, M. WROCHNA, Construction of Hadamard states by pseudo-differential calculus, *Communications in Mathematical Physics*, 325 (2), 713-755 (2013), arXiv:1209.2604;
- [15] D. BAHNS, M. WROCHNA, On-shell extension of distributions, *Annales Henri Poincaré*, 15 (10), 2045-2067, (2014), arXiv:1210.5448;
- [16] J. DEREZIŃSKI, M. WROCHNA, Continuous and holomorphic functions with values in closed operators, *Journal of Mathematical Physics*, 55 (8), 083512, (2013), arXiv:1309.0164;
- [17] M. WROCHNA, Quantum Field Theory in static external potentials and Hadamard states, *Annales Henri Poincaré*, vol. 13, no. 8, 1841–1871, (2012), arXiv:1108.2982;
- [18] J. DEREZIŃSKI, M. WROCHNA, Exactly solvable Schrödinger operators, *Annales Henri Poincaré* vol. 12, no. 2, 397–418, (2011), arXiv:1009.0541.

SCIENTIFIC ACTIVITY

2018.07	Research visit at Dublin City University (01.07–07.07.18)
2018.05	Research visit at TU München (27–31.05.18)
2017.10	Participation in Fields Institute thematic program “Geometric Analysis”
2017.03	Research visit at Université Paris–Sud (21–23.03.17)
2016.09	Research visit at TU München (05–08.09.16)
2016.06	Research visit at the University of Warsaw (27–30.06.16)

- 2016.01 Research visit at Universität Göttingen (13–16.01.16)
- 2015.09 Participation in ESI Program “Modern Theory of Wave Equations”, Erwin Schrödinger Institute, Vienna (04–12.09.15)
- 2015.06 Participation in Research in Paris Program “Géométrie en dimension infinie et théorie quantique du champ de gravitation”, Institut Henri Poincaré, Paris (22–26.06.15)
- 2013.01 Research visit at McGill University, Montréal (13–21.02.13)
- 2012.12 Participation in Junior Hausdorff Trimester Program “Mathematical Physics”, HIM Bonn (4–6.12.12)
- 2012.05 Research visit at Université Paris–Sud (21–27.05.12)
- 2009.09 Research internship at Université de Cergy–Pontoise, supervised by Prof. Vladimir Georgescu
(supported by the French Government)
- 2008 Proofreading of the manuscript “Hypergeometric type functions and their symmetries”, J. Dereziński, *Ann. Henri Poincaré*, (85 p.)

INVITED SEMINAR TALKS

- 2017 Universität Potsdam, Université Paris-Sud, Cardiff University, University of Oxford, University of Cambridge
- 2016 Université Pierre et Marie Curie (Paris 6), University of Warsaw, Université de Lorraine (Metz), TU München, Universität Göttingen, Universität Hannover
- 2015 University of York, Universität Leipzig, UC Berkeley (x2), Johns Hopkins University
- 2014 University of Warsaw, IRMAR Rennes, Institut Henri Poincaré (Paris), Institut Fourier (Grenoble), Université de Cergy-Pontoise
- 2013 Université de Bordeaux 1, University of Warsaw, McGill University, Université Lyon 1, IAS Bonn
- 2012 HIM Bonn, University of Warsaw, Universität Tübingen, Université Paris–Sud, Universität Hamburg

CONFERENCE TALKS

- 2019.09.06 “Introduction to microlocal methods in quantum field theory”, *Introductory Workshop: Microlocal Analysis*, MSRI Berkeley
- 2018.08.27–30 Lecture series (5 lectures)
“Microlocal methods in quantum field theory on curved spacetimes”, summer school *Microlocal Methods in Global Analysis*, Göttingen
- 2018.08.02 “Propagators and distinguished states on curved spacetimes”, *Physics and Mathematics of Quantum Field Theory*, Banff
- 2018.07.24 “The holographic Reeh-Schlieder property”, *ICMP 2018*, Montréal

- 2018.03.20 “The holographic Hadamard condition on asymptotically AdS spacetimes”, *DPG Spring Meeting 2018* conference, Würzburg
- 2017.11.24 “From the Lorentzian to the Euclidean and back: unexpected paths on curved backgrounds”, Conference *Analysis and Geometry in Cargèse*, Cargèse
- 2017.06.09 “The holographic Hadamard condition on asymptotically AdS spacetimes”, Summer school *Quantum Field Theories on Curved Spacetimes*, Lyon
- 2017.05.30 “Quantum Klein-Gordon fields on asymptotically AdS spacetimes”, Conference *Hyperbolic equations and mathematical physics*, Bordeaux
- 2017.01.12 “Hadamard states from data at the de Sitter conformal boundary”, Workshop *Microlocal analysis: a tool to explore the quantum world*, Genoa
- 2016.10.06 “Quantum fields on asymptotically de Sitter spacetimes and their extension across the conformal horizon”, Final AARG meeting *Asymptotic Analysis in General Relativity*, Roscoff
- 2016.01.15 “Extending quantum fields across the de Sitter conformal boundary”, *Local Quantum Pathroads Workshop*, Göttingen
- 2015.05.12 “The classical phase space in the BRST formalism on curved spacetime”, *Annual meeting of the Deutsche Mathematiker-Vereinigung*, Hamburg
- 2015.05.12 “From global propagators to quantum fields: the case of asymptotically Minkowski & extended de Sitter space”, Workshop *Hyperbolic Equations on Spacetimes: Stability, Microlocal Analysis and Quantum Field Theory*, ESI Vienna
- 2015.05.12 “Quantum Field Theory on curved spacetime, or how to make the quantum and the classical live together”, Conference *Journée Théorie CPTGA*, Grenoble
- 2014.11.21 “Problème de Cauchy caractéristique pour l’équation de Klein-Gordon et propagation des singularités”, Conference *Journées EDP Rhône-Alpes-Auvergne*, Lyon
- 2014.09.15 “Remarks on Wick powers of quantum fields on curved spacetime”, Conference *Operator and Geometric Analysis on Quantum Theory*, Levico Terme (Trento)
- 2014.05.20 “Construction of Hadamard states for linearized Yang-Mills equations I”, Workshop *Algebraic Quantum Field Theory: Its Status and Its Future*, ESI Vienna
- 2014.04.25 “Microlocal analysis of Yang-Mills fields”, 34rd Local Quantum Pathroads Workshop, Erlangen
- 2013.05.31 “Construction of Hadamard states by pseudo-differential calculus”, 32nd Workshop *Foundations and Constructive Aspects of QFT*, Wuppertal

- 2012.08.09 Poster “QFT in static external potentials and Hadamard states”, *XVII International Congress on Mathematical Physics*, Aalborg
- 2012.06.22 “On-shell extension of distributions”, 30th Workshop *Foundations and Constructive Aspects of QFT*, Paderborn
- 2011.07.02 “Free QFT in external potentials and Hadamard states”, 28th Workshop *Foundations and Constructive Aspects of QFT*, Göttingen
- 2011.06.26 “Frequency–splitting of tempered distributions and propagators in QFT”, Meeting of the Research Training Group 1493, Goslar

LOCAL SEMINAR TALKS

- Grenoble “Parametrix for the Klein-Gordon equation and Hadamard states” [series of four lectures], Workgroup seminar *Mathematical Physics*,
 “Introduction to the b-calculus”, Workgroup seminar *General Relativity*,
 “Radial estimates and non-elliptic Fredholm problems (after A. Vasy)”, Workgroup seminar *General Relativity*,
 “Wave front sets of solutions of characteristic Cauchy problems”, Workgroup seminar *General Relativity*,
 “The Unruh state on Schwarzschild spacetime (after C. Dappiaggi, V. Moretti & N. Pinamonti)”, Workgroup seminar *General Relativity*,
 “Introduction to Anti-de Sitter spacetime”, Workgroup seminar *General Relativity*,
 “Semi-classical propagation estimates near radial sets (after S. Dyatlov & M. Zworski)”, Workgroup seminar *Mathematical Physics*
- Stanford “Quantum fields on curved spacetime: the microlocal point of view” [series of four lectures], *Analysis and PDE Seminar*,
- Orsay “Extension of singular solutions of PDEs with coefficients degenerate at the origin”, Workgroup seminar *Spectral Analysis and Mathematical Physics*,
- Göttingen “Open problems in renormalization — non-smooth potentials”, Seminar *Special Classes of Oscillatory Integrals*,
 “Introduction to Hadamard states I, II & III”, Seminar *Renormalization in Position Space*,
 “Quantization of charged fields I, II & III”, *Oberseminar Mathematische Physik*,
 “Epstein–Glaser renormalization in the elliptic setting”, Seminar *Hyperbolic versus Elliptic Problems*
- Warsaw “Decay rates in QED”, Seminar *Exact Results in Quantum Theory & Gravity*,
 “Isometries of Schatten class operator spaces”, Seminar *Operator algebras and Quantum Groups*,
 “The hypergeometric equation and the eigenproblem for a certain class of Hamiltonians”, Seminar *Operator algebras and Quantum Groups*,
 “Supersymmetric Quantum Mechanics”, *Main seminar of the Chair of Mathematical Physics*,

“Gelfand-Neumark-Segal representation and its applications in physics”,
Student seminar of theoretical physics

SUMMER SCHOOLS ATTENDED

- 2014 Summer School *Asymptotic Analysis in General Relativity*, Grenoble;
2012 Summer School *Singular Analysis*, Oldenburg;
Summer School *Analysis, with Applications to Mathematical Physics*,
Göttingen;
2010 Noncommutative Geometry Mini-school, Warsaw;
2008 18th Jyväskylä Summer School (mathematics and physics), Jyväskylä.

PARTICIPATION IN CONFERENCES

- 2018 * Summer school *Microlocal Methods in Global Analysis*, Göttingen
* Workshop *Physics and Mathematics of Quantum Field Theory*, BIRS, Banff
* *XIX International Congress on Mathematical Physics*, Montréal
* *DPG Spring Meeting 2018* conference, Würzburg
- 2017 * Conference *Analysis and Geometry in Cargèse*, Cargèse
* Workshop *General Relativity & AdS/CFT*, Fields Institute, Toronto
* Local Quantum Pathroads Workshop, Leipzig
* Summer school and workshop *Quantum field theory on curved space-times*,
Lyon
* Conference *Hyperbolic equations and mathematical physics*, Bordeaux
* Conference *Journée Théorie CPTGA*, Grenoble
* Workshop *Microlocal analysis: a tool to explore the quantum world*, Genoa
- 2016 * Final AARG meeting *Asymptotic Analysis in General Relativity*, Roscoff
* Conference *Spectral Theory and Mathematical Physics*, Cergy-Pontoise
* Conference *Evolution Equations on Singular Spaces*, CIRM, Luminy
* *Final conference of the GDR ‘Quantum Dynamics’*, Grenoble
* Local Quantum Pathroads Workshop, Göttingen
- 2015 * *Semiclassical Analysis and Non-self-adjoint Operators*, CIRM, Luminy
* *Annual meeting of the Deutsche Mathematiker-Vereinigung*, Hamburg
* Workshop *Hyperbolic Equations on Spacetimes: Stability, Microlocal
Analysis and Quantum Field Theory*, ESI Vienna
* Conference *Journée Théorie CPTGA*, Grenoble

- 2014
- * Conference *Journées EDP Rhône-Alpes-Auvergne*, Lyon
 - * Conference *Operator and Geometric Analysis on Quantum Theory*, Levico Terme (Trento)
 - * Conference *Microlocal Analysis and Applications*, Nice
 - * Workshop *Asymptotic Analysis in General Relativity*, Grenoble
 - * Workshop *Algebraic Quantum Field Theory: Its Status and Its Future*, ESI Vienna
 - * 34rd Local Quantum Pathroads Workshop, Erlangen
- 2013
- * 33rd Workshop *Foundations and Constructive Aspects of QFT*, Göttingen
 - * *A Conference in Honor of Yvonne Choquet-Bruhat*, IHES, Bures-sur-Yvette
 - * 32nd Workshop *Foundations and Constructive Aspects of QFT*, Wuppertal
 - * Workshop *Variational & Spectral Methods in Quantum Mechanics*, Paris
- 2012
- * 31st Workshop *Foundations and Constructive Aspects of QFT*, Leipzig
 - * *17th International Congress on Mathematical Physics*, Aalborg
 - * Workshop *Mathematical Aspects of Quantum Field Theory and Quantum Statistical Mechanics*, Hamburg
 - * Workshop *QFT, Periods and Polylogs III*, Berlin
 - * 30th Workshop *Foundations and Constructive Aspects of QFT*, Paderborn
 - * *DPG Frühjahrstagung*, Göttingen
- 2011
- * Conference *Modern Trends in AQFT*, Pavia
 - * 28th Workshop *Foundations and Constructive Aspects of QFT*, Göttingen
 - * Workshop *Foundational Aspects of Cosmology*, Hamburg
- 2010
- * Workshop *Noncommutative Field Theory and Gravity*, Corfu
 - * *Courant Colloquium 2010*, Göttingen
 - * 26th Workshop *Foundations and Constructive Aspects of QFT*, Münster
- 2009
- * *Brian Davies 65th birthday conference*, London
 - * Conference *Constructive and multiscale methods in quantum theory*, Heidelberg

TEACHING

2018/19 [~ 192h in equivalent of tutorial hours]:

- Magistère de Physique lectures/tutorials – M1-M2 level (mathematical physics, spectral theory)
- MAT367 tutorials – L3 level (numerical methods)
- MAT103 lectures/tutorials – L1 level (analysis and algebra for biology students)
- MAT202 tutorials – L1 level (linear algebra)
- MAT204 tutorials – L1 level (calculus and linear algebra)

2017/18 [~ 96 in equivalent of tutorial hours]:

- MAT202 lectures/tutorials – L1 level (linear algebra)
- MAT203 tutorials – L1 level (linear algebra)

2016/17 [~ 192h in equivalent of tutorial hours]:

- MAT304 tutorials – L2 level (linear algebra, analysis in several variables)
- MAT307 tutorials – L2 level (curves, differential equations, computer algebra)
- MAT103 lectures/tutorials – L1 level (analysis and algebra), international group (*in English*)
- MAT206 lectures/tutorials – L1 level (differential equations and population dynamics), international group (*in English*)
- MAT202 tutorials – L1 level (linear algebra)

2015/16 [~ 192h in equivalent of tutorial hours]:

- MAT234 tutorials – L2 level (linear algebra, analysis in several variables)
- MAT11a lectures/tutorials – L1 level (analysis and applications in biology/chemistry), international group (*in English*)
- MAT122 tutorials – L1 level (basic analysis and linear algebra)
- MAT123 lectures/tutorials/oral exams – L1 level (analysis)

2014/15 [~ 96h in equivalent of tutorial hours]:

- MAT234 tutorials – L2 level (linear algebra, analysis in several variables)
- MAT11a lectures/tutorials – L1 level (analysis and applications in biology/chemistry), international group (*in English*)

SUPERVISION AND RELATED ACTIVITIES

2018	Supervisor, MSc thesis: Étienne Blanco, “Inégalités d’énergie en théorie quantique des champs en espace courbe”
2017	Supervisor, BSc internship: Julian Meusel, “The scattering matrix in perturbative Algebraic Quantum Field Theory”
2017	Supervisor, MSc thesis: Clément Tarou, “Propagateurs scalaires sur l’espace Anti-de Sitter”
2016	Sponsor of two French Government Scholarship holders, Student sponsorship program of the French Government

ADMINISTRATIVE TASKS

2018

Organizer, conference *Quantum fields, scattering and spacetime horizons: mathematical challenges*, Les Houches, 22–25.05.18

2017–

Council member, *Teaching and Research Department in Computer Science, Mathematics and Applied Mathematics* (UFR IM²AG)

2016–

Co-organiser, *Mathematical Physics* seminar (with Evelyne Miot),

Co-organiser, workgroup seminar *General Relativity* (with Dietrich Häfner)

PEER REVIEW

Referee for journals including:

Communications in Mathematical Physics, *Letters in Mathematical Physics*, *Annales Henri Poincaré*, *Journal of Mathematical Physics*, *Analysis & PDE*, *Communications in Partial Differential Equations*, *Journal of the European Mathematical Society*, *Mathematical Physics Analysis and Geometry*, *Revue Roumaine de Mathématique Pures et Appliquées*, *Reviews in Mathematical Physics*, *Classical and Quantum Gravity*, *Journal of Spectral Theory*