

RAZVAN G. GURAU

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Organization: CNRS, section 02

Grade: Chargé de recherche, 2ème classe

Birth date : September, 26, 1980

Nationality : Romanian

Civil status: married

Awards

- 2012 **Hermann Weyl Prize 2012**, citation: “Razvan Gurau has discovered and developed the theory of coloured random tensors, which generalises beyond two dimensions the theory of random matrices. His unexpected discovery opens up new avenues for investigation, with potential applications in probability theory, statistical mechanics, integrable systems, quantum field theory and random discrete geometries.”

Distinguished Papers

- 2012 **Annales Henri Poincaré, Distinguished Paper Award for the year 2012**, for the paper “*The complete $1/N$ expansion of colored tensor models in arbitrary dimension*,” Ann. H. Poincare **13**, 399 (2012).
- 2011 **Annales Henri Poincaré, Distinguished Paper Award for the year 2011**, for the paper “*The $1/N$ expansion of colored tensor models*,” Ann. H. Poincare **12**, 829 (2011).
- 2010 **IOP Selected Paper 2010, recommended readers communication**, for the paper “*Lost in Translation: Topological Singularities in Group Field Theory*,” Class. Quant. Grav. **27**, 235023 (2010).

Positions

- 2012- present **Chargé de Recherche 2ème classe, CNRS** Centre de Physique Théorique, UMR 7644, École Polytechnique
- 2012- present **Visiting Fellow**, The Perimeter Institute for Theoretical Physics
- 2010-2012 **Senior Postdoctoral Researcher**, The Perimeter Institute for Theoretical Physics
- 2008-2010 **Postdoctoral Researcher**, The Perimeter Institute for Theoretical Physics

Education

- 2005–2008 **PhD thesis, title: “La renormalisation dans la théorie non commutative des champs”**, advisor: V. Rivasseau, Laboratoire de Physique Théorique bât. 210, CNRS UMR 8627 Université Paris XI, 91405 Orsay Cedex, France
- 2004–2005 **École Normale Supérieure de Paris**, Masters: DEA de Physique Théorique de la Région Parisienne (16.05/20)
- 2002–2004 **École Normale Supérieure de Paris**, Bachelor of Physics: Maitrise de Physique (17/20)
- 1999–2002 **University of Bucharest, Physics Department**, 1st-3rd year undergraduate

Refereed publications and preprints

- 2014 **R. Gurau, V. Rivasseau, A. Sfondrini**, “*Renormalization: an advanced overview*,” arXiv:1401.5003 [hep-th].
- 2013 **R. Gurau, V. Rivasseau**, “*The Multiscale Loop Vertex Expansion*,” arXiv:1312.7226 [math-ph].
- S. Dartois, R. Gurau, V. Rivasseau**, “*Double Scaling in Tensor Models with a Quartic Interaction*,” JHEP **1309**, 088 (2013) arXiv:1307.5281 [hep-th].
- R. Gurau, G. Schaeffer**, “*Regular colored graphs of positive degree*,” arXiv:1307.5279 [math.CO].
- R. Gurau**, “*The $1/N$ Expansion of Tensor Models Beyond Perturbation Theory*,” to appear in Commun. Math. Phys. arXiv:1304.2666 [math-ph].
- R. Gurau, J. P. Ryan** “*Melons are branched polymers*,” to appear in Annales Henri Poincaré arXiv:1302.4386 [math-ph].
- 2012 **R. Gurau**, “*A review of the large N limit of tensor models*,” Proceedings of The XXIX International Colloquium on Group-Theoretical Methods in Physics, August 20-26 2012, Chern Institute of Mathematics, Nankai University, Tianjin, China, arXiv:1209.4295 [math-ph].
- R. Gurau**, “*A review of the $1/N$ expansion in random tensor models*,” Proceedings of the International Congress on Mathematical Physics 2012 - Topical Section: Quantum Field Theory, arXiv:1209.3252 [math-ph] .
- V. Bonzom, R. Gurau, M. Smerlak**, “*Universality in p -spin glasses with correlated disorder*,” J. Stat. Mech. (2013) L02003 arXiv:1206.5539 [cond-mat.dis-nn].
- V. Bonzom, R. Gurau**, “*Counting Line-Colored D -ary Trees*,” arXiv:1206.4203 [math-ph].

Refereed publications and preprints

- R. Gurau** “*The Schwinger Dyson equations and the algebra of constraints of random tensor models at all orders,*” Nucl. Phys. B **865** (2012) arXiv:1203.4965 [hep-th].
- V. Bonzom, R. Gurau, V. Rivasseau**, “*Random tensor models in the large N limit: Uncoloring the colored tensor models ,*” Phys. Rev. D **85**, 084037 (2012) arXiv:1202.3637 [hep-th].
- 2011 **R. Gurau** “*Universality for Random Tensors,*” to appear in Annales de l’Institut Henri Poincaré (B), Probabilités et Statistiques. arXiv:1111.0519 [math.PR].
- R. Gurau** “*The Double Scaling Limit in Arbitrary Dimensions: A Toy Model,*” Phys. Rev. D **84**, 124051 (2011), arXiv:1110.2460 [hep-th].
- R. Gurau, J. P. Ryan** “*Colored Tensor Models - a review,*” SIGMA **8**, 020 (2012) arXiv:1109.4812 [hep-th].
- V. Bonzom, R. Gurau, V. Rivasseau**, “*The Ising Model on Random Lattices in Arbitrary Dimensions,*” Phys. Lett. B **711**, 88 (2012) arXiv:1108.6269 [hep-th].
- D. Benedetti, R. Gurau**, “*Phase Transition in Dually Weighted Colored Tensor Models,*” Nucl. Phys. B **855**, 420 (2012), arXiv:1108.5389 [hep-th].
- R. Gurau** “*A generalization of the Virasoro algebra to arbitrary dimensions,*” Nucl. Phys. B **852**, 592-614 (2011), arXiv:1105.6072 [hep-th].
- V. Bonzom, R. Gurau, A. Riello and V. Rivasseau** “*Critical behavior of colored tensor models in the large N limit,*” Nucl. Phys. B **853**, 174-195 (2011), arXiv:1105.3122 [hep-th].
- R. Gurau** “*The complete $1/N$ expansion of colored tensor models in arbitrary dimension,*” Annales Henri Poincare **13**, 399 (2012), arXiv:1102.5759 [gr-qc].
- R. Gurau and V. Rivasseau** “*The $1/N$ expansion of colored tensor models in arbitrary dimension,*” Europhys. Lett. **95**, 50004 (2011), arXiv:1101.4182 [gr-qc].
- 2010 **R. Gurau** “*The $1/N$ expansion of colored tensor models,*” Annales Henri Poincare **12**, 829 (2011), arXiv:1011.2726 [gr-qc].
- J. B. Geloun and R. Gurau** “*Asymptotes in $SU(2)$ Recoupling Theory: Wigner Matrices, $3j$ Symbols, and Character Localization,*” Annales Henri Poincare **12**, 77 (2011), arXiv:1009.5632 [math-ph].
- J. B. Geloun, R. Gurau and V. Rivasseau**, “*EPRL/FK Group Field Theory,*” Europhys. Lett. **92**, 60008 (2010), arXiv:1008.0354 [hep-th].
- R. Gurau**, “*Lost in Translation: Topological Singularities in Group Field Theory,*” Class. Quant. Grav. **27**, 235023 (2010), arXiv:1006.0714 [hep-th].
- R. Gurau**, “*A Diagrammatic Equation for Oriented Planar Graphs,*” Nucl. Phys. B **839**, 580 (2010), arXiv:1003.2187 [hep-th].

Refereed publications and preprints

- 2009 **R. Gurau**, “*Topological Graph Polynomials in Colored Group Field Theory*,” *Annales Henri Poincare* **11**, 565 (2010), arXiv:0911.1945 [hep-th].
- R. Gurau**, “*Colored Group Field Theory*,” *Commun. Math. Phys.* **304**, 69-93 (2011), arXiv:0907.2582 [hep-th].
- L. Freidel, R. Gurau, D. Oriti**, “*Group field theory renormalization - the 3d case: power counting of divergences*,” *Phys. Rev. D* **80**, 044007 (2009), arXiv:0905.3772 [hep-th].
- R. Gurau, O. J. Rosten** “*Wilsonian Renormalization of Noncommutative Scalar Field Theory*,” *JHEP* **0907**, 064 (2009), arXiv:0902.4888 [hep-th] .
- 2008 **R. Gurau** , “*The Ponzano-Regge asymptotic of the 6j symbol: an elementary proof*,” *Annales Henri Poincare* **9**, 1413 (2008), arXiv:0808.3533 [math-ph].
- R. Gurau, J. Magnen, V. Rivasseau** “*Tree Quantum Field Theory*,” *Annales Henri Poincare* **10**, 867 (2009), arXiv:0807.4122 [hep-th].
- P. Bieliavsky, R. Gurau, V. Rivasseau** “*Non Commutative Field Theory on Rank One Symmetric Spaces*,” *J. Noncom. Geom.* Vol 3, 1 99 (2009), arXiv:0806.4255 [hep-th].
- J. B. Geloun, R. Gurau, V. Rivasseau** “*Vanishing beta function for Grosse-Wulkenhaar model in a magnetic field*,” *Phys. Lett. B* **671**, 284 (2009), arXiv:0805.4362 [hep-th].
- R. Gurau, J. Magnen, V. Rivasseau, A. Tanasa** “*A translation-invariant renormalizable non-commutative scalar model*,” *Commun. Math. Phys.* **287**, 275 (2009), arXiv:0802.0791 [math-ph].
- 2007 **R. Gurau**, “*Exorcizing the Landau ghost in non commutative quantum field theory*,” *J. Phys. Conf. Ser.* **103**, 012011 (2008). Proceedings of the Conference on Non-commutative Geometry and Physics, 23-27 Apr 2007, Orsay, France, arXiv:0709.4169 [hep-th].
- R. Gurau, A. Tanasa** “*Dimensional regularization and renormalization of non-commutative QFT*,” *Annales Henri Poincare* **9**, 655 (2008), arXiv:0706.1147 [math-ph].
- R. Gurau, A. P. C. Malbouisson, V. Rivasseau, A. Tanasa** “*Non-Commutative Complete Mellin Representation for Feynman Amplitudes*,” *Lett. Math. Phys.* **81**, 161 (2007), arXiv:0705.3437 [math-ph].
- 2006 **M. Disertori, R. Gurau, J. Magnen, V. Rivasseau** “*Vanishing of beta function of non commutative $\phi(4)^{**4}$ theory to all orders*,” *Phys. Lett. B* **649**, 95 (2007), arXiv:hep-th/0612251.
- R. Gurau, V. Rivasseau** “*Parametric representation of noncommutative field theory*,” *Commun. Math. Phys.* **272**, 811 (2007), arXiv:math-ph/0606030.

Refereed publications and preprints

- 2005 **R. Gurau, J. Magnen, V. Rivasseau, F. Vignes-Tourneret** “*Renormalization of non-commutative $\phi^{*4}(4)$ field theory in x space,*” *Commun. Math. Phys.* **267**, 515 (2006), arXiv:hep-th/0512271.
- R. Gurau, V. Rivasseau, F. Vignes-Tourneret** “*Propagators for noncommutative field theories,*” *Annales Henri Poincare* **7**, 1601 (2006), arXiv:hep-th/0512071.

Scientific Congress Presentations

- 2013 **July 24th, Loops 13**, The Perimeter Institute, talk titled *The non perturbative $1/N$ expansion of Tensor Models*
- 2012 **August 20th -26th, The XXIX International Colloquium on Group-Theoretical Methods in Physics, GROUP 29** Nankai University talk titled *The Large N Limit of Tensor Models*
- August 6th -11th, International congress on mathematical physics ICMP2012** Aalborg, talk titled *The $1/N$ expansion in random tensor models*
- May 5th-7th, Geometry and Physics GAP 2012** Perimeter Institute talk titled *The Large N Limit of Tensor Models*
- 2008 **June 30th - July 4th Quantum Geometry and Quantum Gravity Conference, QG2 2008**, University of Nottingham, talk titled *Renormalization and Non Commutative Quantum Field Theory in curved background*

Conference Presentations

- 2014 **January 6th-10th, Regards sur la gravité quantique** Univ. Blaise Pascal, Clermont-Ferrand talk titled *The non perturbative $1/N$ expansion of tensor models*
- 2012 **March 26th-29th, Quantum Gravity in Paris**, LPT, Orsay talk titled *The Large N Limit of Tensor Models*
- March 5th-7th, Exploring Quantum Space-Time**, WE-Heraeus-Seminar talk titled *The Large N Limit of Tensor Models*
- 2011 **November 21st, Renormalisabilité en gravité quantique : aspects combinatoires, analytiques et géométriques**, IHP, Paris, talk titled *(Colored) Tensor Models*
- March 21st-23rd, Quantum space time from discreteness to continuum**, LPT, Orsay, talk titled *The $1/N$ expansion in Colored Tensor Models*
- 2009 **September 6th - September 12th, Noncommutative Geometry Conference**, MFO, Oberwolfach, talk titled *Group Field Theory*
- July 28th - 30th, Constructive and Multiscale Methods in Quantum Theory, CMQ 09**, Physikalisches Institut, Heidelberg, talk titled *Two points of view on quantum field theory*

Conference Presentations

- March 23rd - April 3rd, **Algebraic and Combinatorial Structures in Quantum Field Theory, ACQFT 09**, Institut d'Études Scientifiques de Cargèse, talk titled *Hunting bubbles in Group Field Theory*
- 2008 April 7th - 11th, **Combinatorial Identities and their Applications in Statistical Mechanics**, Isaac Newton Institute for Mathematical Sciences, Cambridge, talk titled *Parametric representation of non commutative quantum field theory*
- 2007 November 26nd - 30th, **Non Commutative Quantum Field Theory Workshop**, Erwin Schrodinger Institute, Wien, talk titled *Dimensional regularization and renormalization in non commutative quantum field theory*
- September 2nd - 8th, **Noncommutative Geometry Workshop**, MFO, talk titled *“Renormalization in Non Commutative Quantum Field Theory”*
- April 23rd - 27th, **Non Commutative Geometry and Physics**, LPT Orsay, talk titled *“Exorcizing the Landau ghost in NCQFT”*.
- 2006 September 4th - 8th, **Noncommutative Geometry and Physics: Fundamental Structure of Space and Time**, Isaac Newton Institute for Mathematical Sciences, Cambridge, Poster presented *“Parametric representation in NCQFT”*

Invited Seminars

- 2013 December 2nd, **Mathematical Physics Seminar**, Chalmers University of Technology, talk titled *Random Tensor Models*
- March 25th, **GT Combi**, LIX, talk titled *Graphes colorés et triangulations en dimension supérieure à deux*
- 2012 November 30th, **Journée cartes aléatoires** Université de Nancy, talk titled *Graphes colorés et triangulations en dimension supérieure à deux*
- February 6th, **High Energy Theory Seminar**, Institute for Advanced Study, Princeton, talk titled *The Large N Limit of Tensor Models*
- 2011 December 7th, **Theoretical Physics Seminar**, LPT, ENS Paris, talk titled *(Colored) Tensor Models*
- December 1st, **Theoretical Physics Seminar**, Laboratoire de Physique, ENS Lyon, talk titled *(Colored) Tensor Models*
- November 23rd, **Theoretical Physics Seminar**, IHES, Bures sur Yvette, talk titled *(Colored) Tensor Models*
- November 22nd, **Probability Seminar**, DMA, ENS Paris, talk titled *Universality for Random Tensors*
- April 26th, **ILQGS**, The Perimeter Institute for Theoretical Physics, talk titled *The 1/N expansion in Colored Tensor Models*

Invited Seminars

April 12th, Mathematical Physics Seminar, LIPN, Université Paris 13, talk titled *The $1/N$ expansion in Colored Tensor Models*

April 5th, Mathematical Physics Seminar, CPHT, École Polytechnique, Paris, talk titled *The $1/N$ expansion in Colored Tensor Models*

April 4th, Mathematical Physics Seminar, Institut de Physique Théorique, CEA, Saclay, talk titled *The $1/N$ expansion in Colored Tensor Models*

April 1st, Mathematical Physics Seminar, Institut Camille Jordan, Lyon, talk titled *The $1/N$ expansion in Colored Tensor Models*

2010 **April 21st-28th, Mathematical Physics Seminar**, University of Virginia, Charlottesville, series of lectures in *Group Field Theory*

January 27th, THE Journal Club, McGill University, Montreal, talk titled *Introduction to Group Field Theory*

2009 **December 17th, Quantum Gravity Seminar**, AEI, Berlin, talk titled *Group Field Theory 101*

October 21st, Probability Seminar, UBC, Vancouver, talk titled *Group Field Theory*

September 29th, Mathematical Physics Seminar, CRM, Montreal, talk titled *Group Field Theory*

March 13th, Mathematical Physics Seminar, CPHT, École Polytechnique, Paris, talk titled *Hunting bubbles in Group Field Theory*

Funding

2013 **PEPS** member of the “Cartes3D” program, amount 7000 €.

Project Evaluator

2013 **Expert evaluator** Austrian Science Fund (FWF), START projects.

Organization Experience

2013-present **Quantum Gravity in Paris** conference series organizer, CPHT

2010-2011 **The Quantum Gravity Seminar**, organizer, Perimeter Institute

2009 **November 5th - 8th, Asymptotic Safety - 30 Years Later**, organizer, Perimeter Institute

2009 **The Quantum Gravity group meeting**, organizer, Perimeter Institute

Teaching Experience

- 2013-present **Professor** (joint with V. Rivasseau), Master 2 Concepts fondamentaux de la physique, “Advanced Quantum Field Theory” class.
- 2010 **Instructor** The Perimeter Institute for Theoretical Physics, series of graduate lectures “Introduction to renormalization”
- 2005-2008 **Teaching Assistant** Université Paris 6, 2nd year undergraduate course, “Mathematics for physicists”.

Students Supervised

- 2013-present **T. Delepouve** PhD student, co supervised with V. Rivasseau
- 2010 **A. Sfondrini** master thesis, title “Functional Renormalization and Asymptotic Safety”, completed at the Perimeter Institute for Theoretical Physics.

Fellowships Awarded

- 2005-2008 **Allocation Normalien Moniteur** 3 years dissertation funding
- 2002-2005 **École Normale Supérieure de Paris** ”Selection Inernationale” scholarship

Research Internships

- 2004 **The Ohio State University** “The status of singularities in string theory: The D1D5 and F1P systems”
- Institute Astronomique de Paris** “Modification of the speed of light due to non minimal coupling between gravity and electromagnetism.”
- 2003 **Laboratoire Kastler Brossel** “Experience avec des atomes froides”

Languages

English, French, Romanian (mother tongue).