

Badis Ydri

Département de Physique
Faculté des Sciences
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Field of Research and Study

High Energy Physics Theory

Books

Badis Ydri, Lectures on Matrix Field Theory I, To be published by Springer's Lecture Notes in Physics (LNP), 2016. arXiv:1603:00924.

Badis Ydri, Computational Physics: An Introduction to Monte Carlo Simulations of Matrix Field Theory, To be published by World Scientific, 2016. arXiv:1506:02567.

Badis Ydri, Fundamental Physics, To be published by the Office des Publications Universitaires (OPU), Algeria. arXiv:1603:03764.

Research Directions

Renormalization group equation and Monte Carlo method for matrix and noncommutative field theories.

Emergent physics (gauge, matter, gravity, time, etc) and emergent geometry from matrix models.

Cosmological Yang-Mills matrix models.

AdS/CFT and Yang-Mills matrix models.

Research Funding

Matrix Field Theory and Supersymmetric Gauge Theory: CNEPRU¹ project under contract number D01120130009, 2013-2017.

Noncommutative Field Theory from Matrix Models and Emergent Physics: PNR-ANDRU² project under contract number U23/Av58 (8/u23/2723).

Education

Habilitation³, Theoretical Physics, Université Badji Mokhtar Annaba, Algeria, 2011.

D.Sc.⁴, MESRS⁵, Algeria, 2008.

Ph.D.⁶, Physics, Syracuse University, USA, 2001.

M.Sc., Physics, Syracuse University, USA, 2000.

ICTP Diploma⁷, High Energy Physics, ICTP, Italy, 1996.

D.E.A⁸, Theoretical Physics, Université de Constantine, Algeria, 1994.

D.E.S⁹, Theoretical Physics, Université de Constantine, Algeria, 1993.

Baccalaureat, Mathematics, 1989.

Post-Doctoral Experience

August 2006-August 2008, Marie-Curie Postdoctoral Fellow, European Commission, Institut für Physik, Humboldt-Universität Zu Berlin, Berlin, Germany.

October 2001-October 2004, Hamilton Postdoctoral Fellow, School of Theoretical Physics, Dublin Institute for Advanced Studies, Dublin,Ireland.

Honors, Awards, and Fellowships

January 2015-..., ICTP Regular Associate, Abdus Salam Center for Theoretical Physics, Trieste, Italy.

November 2009-..., DIAS Research Associate, School of Theoretical Physics, Dublin Institute for Advanced Studies,Dublin,Ireland.

August 2006, Marie-Curie Fellow, European Commission, Institut für Physik, Humboldt-Universität Zu Berlin, Berlin, Germany.

October 2001, Hamilton Fellow, School of Theoretical Physics,Dublin Institute for Advanced Studies , Dublin, Ireland.

2002 Syracuse University Doctoral Prize, Syracuse University, New York, USA.

2000-2001, Syracuse University Fellowship, Syracuse University, New York,USA.

First Class Honor -ICTP Diploma 1996, International Center for Theoretical physics, Trieste, Italy.

First Class Honor -DES 1993, Constantine University, Algeria.

Supervision

Co-supervision (completed) of two doctoral students (P.Castro-Villarreal and R.Delgadillo-Blando) with Professor Denjoe O'Connor.

Supervision of four doctoral students:

Rachid Ahmim, Noncommutative Field Theory, The Renormalization Group and Matrix Models, Since 2009, To be defended October 2016.

Cherin Soudani, Emergent Noncommutative Geometry and Matrix Models, Since 2009, To be defended December 2017.

Ramda Khaled, Emergent Geometry and Gauge Theory in 4 Dimensions and the Noncommutative Torus, Since 2012, To be defended December 2016.

Ahlam Rouag, Phase Diagrams of Multitrace, Gauge and Supersymmetric Matrix Models and Emergent Geometry, Since 2013, To be defended June 2017.

Supervision (completed) of three master students:

Ramda Khaled, Quenched Quantum Electrodynamics on the Lattice, 2012.

Rouag Ahlam, Elements of Cosmological Inflation, 2013.

Talhi Fatima, The Cosmological Constant, Vacuum Energy and Dark Energy, 2012.

Co-supervision (completed) of a master student with Doctor Adel Bouchareb:

Sana Toumiat, Scalar Φ_2^4 on Lattice, 2015.

Teaching

2005-2006 (assistant professor), 2008-2016 (associate professor) and 2016-..(professor), Badji Mokhtar Annaba University, Annaba, Algeria.

Master: Quantum Field Theory, General Relativity and Cosmology, Quantum Mechanics.

Bachelor and Master: Computational Physics.

Bachelor: Classical Mechanics, Thermodynamics.

2004-2005, Lecturer, National University of Ireland, Maynooth, Ireland.

Bachelor: Particle Physics, Mathematical Methods for Physics.

1996-2000, Teaching Assistant, Department of Physics, Syracuse University, USA.

General Physics I (Mechanics), General Physics II (Electricity and Magnetism), General Physics Lab I (Mechanics), General Physics Lab II (Electricity and Magnetism).

Service

2012: A new doctoral program in theoretical physics is launched, Physics Departement, Badji Mokhtar Annaba University.

2012: A new research group "physique des particules théorique et gravitation" is formed as a part of the "Laboratoire de physique des rayonnements", Badji Mokhtar Annaba University.

2010: A new master program in theoretical physics is launched, Physics Departement, Badji Mokhtar Annaba University.

Since 2009: The ongoing development of a new computational physics course, Physics Departement, Badji Mokhtar Annaba University¹⁰.

2012: Magister examination committee (L.Dehbi), Houari Boumediene Algiers University.

Since 2012: Master examination committees (theoretical physics).

Review work for MPLA, EPJC, PRD and IJMPA.

Language and Computational Skills and Hobbies

Language skill: Arabic(native)/English(excellent)/French(very good).

Computer skill: UNIX operating system and Fortran/C programming.

Hobbies: Reading philosophy and history of science.

Notes

¹CNEPRU: The national commission for the evaluation of university research projects.

²ANDRU: The National Agency for the Development of University Research.

³Dissertation: "Noncommutative Gauge Theory As/Is Matrix Models Around Fuzzy Vacua And Emergent Geometry".

⁴Equivalence.

⁵Ministère de l' Enseignement Supérieur et de la Recherche Scientifique.

⁶Thesis: "Fuzzy Physics ". Supervisor: A.P.Balachandran.

⁷Dissertation: "The Two-Dimensional $O(N)$ Bosonization". Supervisor : K.S.Narain.

⁸Diplôme D'Études Approfondie.

⁹Diplôme D'Études Superieures.

¹⁰As far as I know this is the first course of its kind in the country.

Publication List

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Peer-Reviewed Journal Articles

- B. Ydri, K. Ramda and A. Rouag, “Phase diagrams of the multitrace quartic matrix models of noncommutative Φ^4 theory,” *Phys. Rev. D* **93**, no. 6, 065056 (2016) [arXiv:1509.03726 [hep-th]].
- B. Ydri, A. Rouag and K. Ramda, “Emergent geometry from random multitrace matrix models,” *Phys. Rev. D* **93**, no. 6, 065055 (2016) [arXiv:1509.03572 [hep-th]].
- Badis Ydri, Rachid Ahmim and Adel Bouchareb, “Wilson RG of Noncommutative Φ_4^4 ,” *Int. J. Mod. Phys. A* **30**, no. 33, 1550195 (2015) [arXiv:1509.03605 [hep-th]].
- B. Ydri, “A Multitrace Approach to Noncommutative Φ_2^4 ,” *Phys. Rev. D* **93**, no. 6, 065041 (2016) [arXiv:1410.4881 [hep-th]].
- B. Ydri, “Remarks on the eigenvalues distributions of $D \leq 4$ Yang-Mills matrix models,” *Int. J. Mod. Phys. A* **30**, no. 01, 1450197 (2014) [arXiv:1410.4884 [hep-th]].
- Badis Ydri, “New algorithm and phase diagram of noncommutative ϕ^4 on the fuzzy sphere,” *JHEP* **1403**, 065 (2014) [arXiv:1401.1529 [hep-th]].
- B. Ydri and A. Bouchareb, “On the Problem of Vacuum Energy in FLRW Universes and Dark Energy,” *Mod. Phys. Lett. A* **28**, 1350166 (2013) [arXiv:1307.2749 [hep-th]].
- B. Ydri and R. Ahmim, “Matrix Model Fixed Point of Noncommutative Phi-Four,” *Phys. Rev. D* **88**, 106001 (2013) [arXiv:1304.7303 [hep-th]].
- B. Ydri, “Impact of Supersymmetry on Emergent Geometry in Yang-Mills Matrix Models II,” *Int. J. Mod. Phys. A* **27**, 1250088 (2012) [arXiv:1206.6375 [hep-th]].
- B. Ydri and A. Bouchareb, “The fate of the Wilson-Fisher fixed point in non-commutative ϕ^4 ,” *J. Math. Phys.* **53**, 102301 (2012) [arXiv:1206.5653 [hep-th]].
- R. Delgadillo-Blando, D. O’Connor and B. Ydri, “Matrix Models, Gauge Theory and Emergent Geometry,” *JHEP* **0905**, 049 (2009) [arXiv:0806.0558 [hep-th]].
- R. Delgadillo-Blando, D. O’Connor and B. Ydri, “Geometry in transition: A model of emergent geometry,” *Phys. Rev. Lett.* **100**, 201601 (2008) [arXiv:0712.3011 [hep-th]].
- B. Ydri, “A Proposal for a Non-Perturbative Regularization of $\mathcal{N} = 2$ SUSY 4D Gauge Theory,” *Mod. Phys. Lett. A* **22**, 2565 (2007) [arXiv:0708.3066 [hep-th]].
- B. Ydri, “Notes on noncommutative supersymmetric gauge theory on the fuzzy supersphere,” *Int. J. Mod. Phys. A* **22**, 5179 (2007) [arXiv:0708.3065 [hep-th]].
- D. Dou and B. Ydri, “Topology Change From Quantum Instability of Gauge Theory on Fuzzy CP^2 ,” *Nucl. Phys. B* **771**, 167 (2007) [arXiv:hep-th/0701160].
- B. Ydri, “Quantum Equivalence of NC and YM Gauge Theories in 2D and Matrix Theory,” *Phys. Rev. D* **75**, 105008 (2007) [arXiv:hep-th/0701057].
- R. Delgadillo-Blando and B. Ydri, “Towards noncommutative fuzzy QED,” *JHEP* **0703**, 056 (2007) [arXiv:hep-th/0611177].
- B. Ydri, “The one-plaquette model limit of NC gauge theory in 2D,” *Nucl. Phys. B* **762**, 148 (2007) [arXiv:hep-th/0606206].

- D. O'Connor and B. Ydri, "Monte Carlo simulation of a NC gauge theory on the fuzzy sphere," JHEP **0611**, 016 (2006) [arXiv:hep-lat/0606013].
- D. Dou and B. Ydri, "Entanglement Entropy on Fuzzy Spaces," Phys. Rev. D **74**, 044014 (2006) [arXiv:gr-qc/0605003].
- P. Castro-Villarreal, R. Delgadillo-Blando and B. Ydri, "Quantum effective potential for $U(1)$ fields on $S_L^2 \times S_L^2$," JHEP **0509**, 066 (2005) [arXiv:hep-th/0506044].
- B. Ydri, "Noncommutative $U(1)$ gauge theory as a non-linear sigma model," Mod. Phys. Lett. **19**, 2205 (2004) [arXiv:hep-th/0405208].
- P. Castro-Villarreal, R. Delgadillo-Blando and B. Ydri, "A gauge-invariant UV-IR mixing and the corresponding phase transition for $U(1)$ fields on the fuzzy sphere," Nucl. Phys. B **704**, 111 (2005) [arXiv:hep-th/0405201].
- B. Ydri, "Exact solution of noncommutative $U(1)$ gauge theory in 4–dimensions," Nucl. Phys. B **690**, 230 (2004) [arXiv:hep-th/0403233].
- S. Vaidya and B. Ydri, "On the origin of the UV-IR mixing in noncommutative matrix geometry," Nucl. Phys. B **671**, 401 (2003) [arXiv:hep-th/0305201].
- B. Ydri, "Noncommutative chiral anomaly and the Dirac-Ginsparg-Wilson operator," JHEP **0308**, 046 (2003) [arXiv:hep-th/0211209].
- G. Alexanian, A. P. Balachandran, G. Immirzi and B. Ydri, "Fuzzy \mathbf{CP}^2 ," J. Geom. Phys. **42**, 28 (2002) [arXiv:hep-th/0103023].
- B. Ydri, "Noncommutative geometry as a regulator," Phys. Rev. D **63**, 025004 (2001) [arXiv:hep-th/0003232].
- K. S. Gupta and B. Ydri, "Quantum field theories on null surfaces," Int. J. Mod. Phys. A **16**, 1789 (2001) [arXiv:hep-th/0002177].
- A. P. Balachandran, T. R. Govindarajan and B. Ydri, "The fermion doubling problem and noncommutative geometry," Mod. Phys. Lett. A **15**, 1279 (2000) [arXiv:hep-th/9911087].
- S. Baez, A. P. Balachandran, B. Ydri and S. Vaidya, "Monopoles and solitons in fuzzy physics," Commun. Math. Phys. **208**, 787 (2000) [arXiv:hep-th/9811169].

Preprints

- B. Ydri, "Fundamental Physics," arXiv:1603.03764 [physics.class-ph].
- B. Ydri, "Lectures on Matrix Field Theory I," arXiv:1603.00924 [hep-th].
- B. Ydri, "Computational Physics: An Introduction to Monte Carlo Simulations of Matrix Field Theory," arXiv:1506.02567 [hep-lat].
- B. Ydri, "Impact of Supersymmetry on Emergent Geometry in Yang-Mills Matrix Models," arXiv:1203.0906 [hep-th].
- S. Vaidya and B. Ydri, "New scaling limit for fuzzy spheres," arXiv:hep-th/0209131.
- B. Ydri, "Fuzzy physics," arXiv:hep-th/0110006.
- A. P. Balachandran, T. R. Govindarajan and B. Ydri, "The fermion doubling problem and noncommutative geometry. II," arXiv:hep-th/0006216.

Unpublished Lectures

- B. Ydri, "Quantum Field Theory and Particle Physics," 435 pages, can be found on my webpage.
- B. Ydri, "Lectures on General Relativity and Related Topics," 260 pages, can be found on my webpage.

Conference and Seminar Presentations

- B. Ydri, "Aspects of Noncommutative ϕ^4 on the Fuzzy Sphere," The 9th International Conference in Subatomic Physics and Applications, Constantine University, October 2013.
- B. Ydri, "New Phenomena in NC Field Theory and Emergent Spacetime Geometry," The 3rd Algerian Workshop on Astronomy and Astrophysics, Constantine University, AIP Conf. Proc. **1295**, 150 (2010) [arXiv:1007.4829 [hep-th]].
- B. Ydri, Phase Structure of Noncommutative Gauge Theory on the Fuzzy Sphere II, Workshop on Fuzzy Physics, June 2006, Dublin Institute For Advanced Studies, Ireland.
- B. Ydri, Phase Structure of Noncommutative Gauge Theory on the Fuzzy Sphere, Quantum Spaces-Noncommutative Geometry Network Meeting, November 2004, Dublin Institute For Advanced Studies, Ireland.
- B. Ydri, Some Quantum Aspects of Noncommutative Fuzzy Gauge Fields, 11th Irish QFT Conference, May 2004, National University of Ireland,Maynooth,Ireland.
- B. Ydri, The Fuzzy Schwinger Model, 10th Irish QFT Conference, May 2003, National University of Ireland,Galway,Ireland.
- G. Immirzi and B. Ydri, "Chiral symmetry on fuzzy sphere S_L^2 ," 1st Conference on Theoretical High Energy Physics, SUNY Institute of Technology at Utica/Rome, October 2001, Conference Proceedings edited by A.H.Fariborz and E.Rusjan, arXiv:hep-th/0203121.
- B. Ydri, "Fuzzy non-trivial gauge configurations," 23rd Annual Montreal-Rochester-Syracuse-Toronto Meeting on High-Energy Physics, University of Western Ontario, London, Ontario, May 2001, Conference Proceedings edited by D.G.McKeon and V.W.Elias, arXiv:hep-th/0108079.