Matías Raja
Curriculum Vitae

PERSONAL DETAILS

Address   Department of Mathematics
Universidad de Murcia
Campus de Espinardo
30100 Murcia, SPAIN

Phone   (+34) 868884166

Mail   `matias@um.es`

EDUCATION

Ph.D. in Mathematics — 1998/1999

Université Bordeaux 1 / Universidad de Murcia

Thesis title: Borel measurability and renorming in Banach spaces.

Degree in Mathematics — 1989-1994

Universidad de Murcia

Spanish title *Licenciatura* in Fundamental Mathematics.

EMPLOYMENT

Full Professor — 2021-present

Universidad de Murcia, Full-time

Teaching and research in the area of Mathematical Analysis.

Associate Professor — 2002-2021

Universidad de Murcia, Full-time

Teaching and research in the area of Mathematical Analysis.

Assistant Professor — 1997-2002

Universidad de Murcia, Part-time

Subjects related to Mathematical Analysis and Applied Mathematics.

LANGUAGES

Spanish (mother tongue)
English (fluent)
French (fluent)
Italian (basic)

ADMINISTRATION AND ORGANISATION

Secretary of Department `2009-2013`
Departamento de Matemáticas
    Universidad de Murcia

Principal Investigator `2022-2025`
Research grant MCIN PID2021- 122126NB-C32
    Funded €139.150,00 – duration 4 years

Principal Investigator `2018-2021`
Research grant MINECO MTM2017-83262-C2-2-P
    Funded €71.753,00 – duration 4 years

Principal Investigator `2015-2017`
Research grant MINECO MTM2014-57838-C2-1-P
    Funded €82.280,00 – duration 3 years

Organiser of scientific meeting `2018`
XVI Encuentros de Análisis Funcional Murcia - Valencia
    https://www.um.es/beca/xvieafmv/

Organiser of scientific meeting `2016`
ALEL2016 International Conference in Optimization Theory and its Applications
    http://www.um.es/beca/alel2016/

Organiser of scientific meeting `2016`
IV Workshop in Functional Analysis of Murcia
    http://www.um.es/beca/workshop2016/

Organiser of scientific meeting `2013`
Parallel session RSME Congress, Santiago de Compstela
    http://www.usc.es/congresos/rsme2013/docs/abstracts/sesion-07.pdf

FOREIGN STAYS[1]

University College London `1995`
PhD Student, May/June
    advisor: John Jayne

University of Bordeaux `1996/97`
PhD Student, all the academic year
    advisor: Robert Deville

Hebrew University of Jerusalem `2003/04`
Postdoc Student, October/January + April
    advisor: Joram Lindenstrauss

Université de Franche-Comté `2018`
Research Stay, March/June
    responsible: Gilles Lancien

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[1]AT LEAST ONE MONTH LONG

DOCTORAL ADVISING

Simone Ferrari   2013
Localization techniques for renorming
    Università degli Studi di Milano

Luis C. García Lirola   2017
Convexity, Optimization and Geometry of the Ball in Banach Spaces
    Universidad de Murcia

Guillaume Grelier   2022
Super weak compactness and its applications to Banach space theory
    Universidad de Murcia

PAPERS

1. Subspaces of Hilbert-generated Banach spaces and the quantification of super weak compactness. *J. Funct. Anal.* 284 (2023), 109889, 19 pp. (with G. Grelier)

2. Non linear aspects of super weakly compact sets. *Ann. Inst. Fourier* 72 (2022), 1305–1328 (with G. Lancien)

3. Uniformly convex functions. J. Math. Anal. Appl. 505 (2022), Issue 1, 125442, 25 pp. (with G. Grelier).

4. Uniformly convex renormings and generalized cotypes. *Adv. Math.* 383 (2021), 107679, 23 pp. (with L.C. García Lirola).

5. Generalized metric properties of spheres and renorming of Banach spaces. *RACSAM* 113 (2019), no. 3, 2655–2663 (with S. Ferrari and J. Orihuela).

6. Asymptotic and coarse Lipschitz structures of quasi-reflexive Banach spaces. *Houston J. Math.* 44 (2018), 927–940 (with G. Lancien)

7. Maps with the Radon-Nikodym property. *Set-Valued Var. Anal.* 26 (2018), 77–93. (with L.C. García Lirola)

8. On strong asymptotic uniform smoothness and convexity. Rev. Mat. Complut. 31 (2018), 131–152. (with L.C. García Lirola)

9. Compact convex sets that admit a lower semicontinuous strictly convex function. *J. Convex Anal.* 24 (2017), 987–998. (with L.C. García Lirola and J. Orihuela)

10. A Bourgain-like property of Banach spaces with no copies of c_0. *RACSAM* 111 (2017), 205-211. (with A. Pérez).

11. Szlenk index of convex hulls. *J. Funct. Anal.* 272 (2017), 498–521. (with G. Lancien and T. Prochazka).

12. Lipschitz subspaces of $C(K)$. *Topology Appl.* 204 (2016), 149–156. (with N. Jonard).

13. Super WCG Banach spaces. *J. Math. Appl.* 439 (2016), no. 1, 183–196.

14. Weakly metrizabilty of spheres and renorming of normed spaces. *Q. J. Math.* 67 (2016), no. 1, 15–27. (with S. Ferrari and J. Orihuela).

15. Metrization theory and the Kadec property. *Banach J. Math. Anal.* 10 (2016), no. 2, 281–306. (with S. Ferrari, L. Oncina, and J. Orihuela).

16. Conditionality constants of quasi-greedy bases in super-reflexive Banach spaces. *Studia Math.* 227 (2016), no. 2, 133–140. (with F. Albiac, J.L Ansorena, G. Garrigós and E. Hernández).

17. Finite slicing in superreflexive Banach spaces. *J. Funct. Anal.* 268 (2015), no. 9, 2672–2694.

18. Two applications of smoothness in $C(K)$ spaces. *Studia Math.* 225 (2014), no. 1, 1–7.

19. Radon-Nikodým indexes and measures of weak noncompactness. *J. Funct. Anal.* 267 (2014), no. 10, 3830–3858. (with B. Cascales and A. Pérez)

20. On asymptotically uniformly smooth Banach spaces. *J. Funct. Anal.* 264 (2013), no. 2, 479–492.

21. Scalar boundedness of vector-valued functions. *Glasg. Math. J.* 54 (2012), no. 2, 325–333. (with J. Rodríguez).

22. Compact spaces of Szlenk index ω. *J. Math. Anal. Appl.* 391 (2012), no. 2, 496–509.

23. On weak* uniformly Kadec-Klee renormings. *Bull. Lond. Math. Soc.* 42 (2010), no. 2, 221–228.

24. Continuity at the extreme points. *J. Math. Anal. Appl.* 350 (2009), no. 2, 436–438.

25. Finitely dentable functions, operators and sets. *J. Convex Anal.* 15 (2008), no. 2, 219–233.

26. Dentability indices with respect to measures of non-compactness. *J. Funct. Anal.* 253 (2007), no. 1, 273–286.

27. Distance to spaces of continuous functions. *Topology Appl.* 153 (2006), no. 13, 2303–2319. (with B. Cascales and W. Marciszewski).

28. On the dentability of weak*-$\mathcal{H}_\delta$ sets. *Q. J. Math.* 56 (2005), no. 3, 377–382.

29. Embedding ℓ_1 as Lipschitz functions. *Proc. Amer. Math. Soc.* 133 (2005), no. 8, 2395–2400.

30. Descriptive compact spaces and renorming. *Studia Math.* 165 (2004), no. 1, 39–52. (with L. Oncina).

31. Bounded tightness for weak topologies. *Arch. Math.* (Basel) 82 (2004), no. 4, 324–334. (with B. Cascales).

32. Borel properties of linear operators. *J. Math. Anal. Appl.* 290 (2004), no. 1, 63–75.

33. Descriptive properties of spaces of signed measures. *Acta Univ. Carolin. Math. Phys.* 44 (2003), no. 2, 79–88. (with O. Kalenda)

34. First Borel class sets in Banach spaces and the asymptotic-norming property. *Israel J. Math.* 138 (2003), 253–270.

35. Measurable selectors for the metric projection. Math. Nachr. 254/255 (2003), 27–34. (with B. Cascales).

36. Weak* locally uniformly rotund norms and descriptive compact spaces. *J. Funct. Anal.* 197 (2003), no. 1, 1–13.

37. On some class of Borel measurable maps and absolute Borel topological spaces. *Topology Appl.* 123 (2002), no. 2, 267–282.

38. On dual locally uniformly rotund norms. *Israel J. Math.* 129 (2002), 77–91.

39. Locally uniformly rotund norms. *Mathematika* 46 (1999), no. 2, 343–358.

40. On topology and renorming of Banach space. *C. R. Acad. Bulgare Sci.* 52 (1999), no. 3-4, 13–16.

41. Kadec norms and Borel sets in a Banach space. *Studia Math.* 136 (1999), no. 1, 1–16.

BOOKS

1. Análisis Funcional, Ediciones Electolibris 2012 (reprint 2018), 373 pages (with B. Cascales, J.M. Mira and J. Orihuela).

2. Two chapters: Banach spaces I, Banach spaces II, in *Encyclopedia of General Topology*, Edited by K.P. Hart, J. Nagata, J.E. Vaughan. pp. 449 - 458. North-Holland, 2003. (with B. Cascales, I. Namioka and J. Orihuela)

3. Métodos estadísticos en biomedicina, *Curso de preparación BIR*, Ilustre Colegio Oficial de Biólogos de la Región de Murcia, 222 pages, ISBN 978-84-09-39983-3. (editor, with G. Luengo, L. Sáenz-Mateos)

ABBREVIATED RESEARCH STORY

My main research line is Banach space geometry, with some incursions in general topology, descriptive set theory and convex analysis. I have developed new techniques for renorming, leading to precise characterizations in terms of countable decompositions and topological-like properties for a variety of norms: Kadec, LUR, w*LUR, ANP, UKK*, AUS and UR. I am also interested in the structure of convex sets and convex functions. My research in topology and descriptive set theory is motivated by the peculiarities of the weak topology of a Banach space: neither metrizability nor separability assumptions. For that setting, I have introduced a classification of Borel sets and characterized absolute Borel spaces. In relation with Banach spaces, I have studied several kinds of compacta: descriptive, Namioka-Phelps and, more recently, super weakly compact sets.

I have a total of 41 published papers in Mathematics, 2 chapters in a research book and 285 citations in MathSciNet. My results are quoted in at least 15 books, including Convex Functions by J. M. Borwein and V. Vanderverff (2010), and Martingales in Banach spaces by G. Pisier (2016). During the preparation of my papers, I have collaborated with 17 colleagues. Notably, I have co-authored 3 papers with Gilles Lancien (Université Bourgogne Franche-Comté, Besançon, France) since 2017.

In the last 10 years I have supervised two PhD theses: L. C. Garcia-Lirola (2018), G. Grelier 2022. Also, I oversee an Erasmus+ program with Université Nazi Boni of Bobo-Dioulasso (Burkina Faso), where I have been lecturing on Functional Analysis in two occasions, and another Erasmus+ program with V. N. Karazin Kharkiv National University (Ukraine).