Diego González Sánchez

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EMPLOYMENT

- January 2021 - Present: **Postdoctoral researcher**, *Alfréd Rényi Institute of Mathematics*. Supervisor: Balázs Szegedy.

EDUCATION

- 2016 - September 2020: **Ph.D.**, *Autonomous University of Madrid*.
  Title of the thesis: *Topics in additive combinatorics and higher order Fourier analysis*. Supervisor: Pablo Candela.
- 2015 - 2016: **MASt in Pure Mathematics (Part III)**,*Cambridge University*. Grade: Merit.
- 2009 - 2015: **BSc in Mathematics**, *Autonomous University of Madrid*. Grade: Sobresaliente.
- 2009 - 2015: **BSc in Computer Science**, *Autonomous University of Madrid*. Grade: Sobresaliente.

VISITING PERIODS

- May 2019 - August 2019: **Visiting researcher**, *Alfred Renyi Institute of Mathematics* with Balázs Szegedy.
- 2013 - 2014: **Erasmus student**, *Technical University of Denmark*.

PUBLICATIONS

1. **On measure-preserving F_p^ω systems of order k**. With P. Candela and B. Szegedy), Accepted for publication at Journal d'Analyse Mathèmatique.
2. **On higher-order Fourier analysis in characteristic p**. With P. Candela and B. Szegedy. Ergodic Theory and Dynamical Systems, 1-70, (2022).
3. **A refinement of Cauchy-Schwarz complexity**. With P. Candela and B. Szegedy. European Journal of Combinatorics 106, 103592 (2022).
4. **A Refinement of Cauchy-Schwarz Complexity, with Applications**. With P. Candela and B. Szegedy. Extended Abstracts EuroComb 2021, 293-298 (2021). (This is a short version of *A refinement of Cauchy-Schwarz complexity* presented for EUROCOMB 2021).
5. **Optimal transport with f-divergence regularization and generalized Sinkhorn algorithm**. With D. Terjék. International Conference on Artificial Intelligence and Statistics, 5135-5165 (2022).
6. **New estimates for exponential sums over multiplicative subgroups and intervals in prime fields**. With D. Di Benedetto, M. Z. Garaev, V. C. Garcia, I. E. Shparlinski, and C. A. Trujillo. Journal of Number Theory 215, 261-274 (2020).
7. **On sets with small sumset and m-sum-free sets in $\mathbb{Z}/p\mathbb{Z}$**. With P. Candela and D. J. Grynkiewicz. Bulletin de la Société Mathématique de France 149 (1), 155-177 (2020).
8. **A step towards the $3k-4$ conjecture in $\mathbb{Z}/p\mathbb{Z}$ and an application to m-sum-free sets**. With P. Candela and D. J. Grynkiewicz. Acta Mathematica Universitatis Comenianae, Volume 88, (2019), Issue 3, pp. 521-525 (2019).

(This is a short version of *On sets with small sumset and m-sum-free sets in* $\mathbb{Z}/p\mathbb{Z}$ presented for EUROCOMB 2019).

9. **A note on the Bilinear Bogolyubov Theorem: Transverse and bilinear sets .** With P.-Y. Bienvenu and A. D. Martínez. Proceedings of the American Mathematical Society 148 (1), 23-31 (2020).
10. **On nilspace systems and their morphisms.** With P. Candela and B. Szegedy. Ergodic Theory and Dynamical Systems, 1-15 (2019).
11. **A Plünnecke-Ruzsa inequality in compact abelian groups.** With P. Candela and A. de Roton. Revista Matemática Iberoamericana 35 (7), 2169-2186 (2019).

PREPRINTS

- **On the inverse theorem for Gowers norms in abelian groups of bounded torsion**. With P. Candela and B. Szegedy, ArXiv:2311.13899.
- **Free nilspaces, double-coset nilspaces, and Gowers norms**. With P. Candela and B. Szegedy, ArXiv:2305.11233.
- **A framework for overparameterized learning**. With D. Terjék. ArXiv:2205.13507.
- **On $\mathbb{F}_2^\omega$-affine-exchangeable probability measures**. With P. Candela and B. Szegedy. ArXiv:2203.08915.

GRANTS AND AWARDS

- 2021: *Extraordinary Prize of the Autonomous University of Madrid* awarded to the best theses presented at the university in the year 2019 - 2020.
- 2016 - 2020: *La Caixa Severo Ochoa scholarship.* PhD funding
- 2015 - 2016: *X Mutua Madrileña Posgraduate Scholarship* Master's funding.
- 2014 - 2015: *JAE-intro scholarship.*

PROJECTS

Some projects in which I have participated:

- 2023 - 2025: Artificial Intelligence National Laboratory (MILAB), the Hungarian government.
- 2021 - 2024: Harmonic analysis, combinatorics and arithmetic, MICINN, Spain.
- 2020 - 2022: Momentum (Lendület) 30003, Hungarian government.
- 2021 - 2022: NKFIH "Élvonal" KKP 133921 grant, Hungarian government.
- 2018 - 2020: Arithmetic and harmonic analysis, MINECO, Spain.
- 2016 - 2017: Encounters between analysis and number theory MINECO, Spain.

TALKS AND PRESENTATIONS

- November 2023: *On measure-preserving F_p^ω systems of order k*, Wuppertal, Germany.
- June 2023: *Free nilspaces, double-coset nilspaces, and Gowers norms*, Będlewo Conference Center, Poland.
- May 2022: *On affine-exchangeable measures and nilspaces.* Alfréd Rényi Institute of Mathematics, Budapest, Hungary.
- September 2021: *A Refinement of Cauchy-Schwarz Complexity, with Applications*, EuroCom 2021, online (Barcelona, Spain).
- August 2019: *The $3k-4$ theorem in $\mathbb{Z}/p\mathbb{Z}$ and an application to m-sum-free sets*, EuroComb 2019, Univerzita Komenskeho, Bratislava.
- July 2019: *On a extension of the inverse limit theorem for nilspaces*, at Alfred Renyi Institute of Mathematics, Budapest, Hungary.

- March 2019: *Conjuntos grandes que se parecen a progresiones en grupos cíclicos de orden primo*, at Autonomous University of Madrid, Spain.
- June 2018: *A Plünnecke-Ruzsa inequality in compact abelian groups*, UAM, Madrid, Spain.
- December 2017: *A Plünnecke-Ruzsa inequality in compact abelian groups*, University of Buenos Aires, Argentina.
- March 2017: *The polynomial method in additive combinatorics.* at Autonomous University of Madrid, Spain.

EVENTS

- November 2023: 11th Miniworkshop on Operator Theoretic Aspects of Ergodic Theory, Wuppertal, Germany (assistant).
- July 2023: 200 Years of Trinity Combinatorics, Cambridge, United Kingdom (assistant).
- June 2023: Nilpotent structures in topological dynamics, ergodic theory and combinatorics, BędIewo Conference Center, Poland (assistant).
- June 2022: Rényi 100, Alfréd Rényi Institute of Mathematics, Budapest, Hungary (assistant).
- May 2022: Graphs, groups and stochastic processes workshop. Alfréd Rényi Institute of Mathematics, Budapest, Hungary (assistant).
- August 2021: AGRA IV (Arithmetic, Groups and Analysis), online (Trieste, Italy), (instructor).
- August 2019: EUROCOMB 2019, Univerzita Komenskeho, Bratislava, Slovakia (participant).
- August 2019: *Number theory in the Americas.* Casa Matemática Oaxaca, Oaxaca, Mexico (participant).
- September 2018: *Arithmetic Ramsey Theory*, University of Manchester, Manchester, UK (assistant).
- December 2017: *LXVI meeting of scientific communications.* University of Buenos Aires, Argentina (participant).
- September 2017: *The music of Numbers. Conference in honor of Javier Cilleruelo.* ICMAT, Madrid, Spain (assistant).
- May - June 2017: *Graduate course on Interactions of harmonic analysis, combinatorics and number theory.* BGSMath, Barcelona, Spain (assistant).
- 2016 - 2017: Various seminars of Harmonic Analysis and Number Theory at ICMAT and UAM, Madrid, Spain (assistant).

TEACHING EXPERIENCE

- 2023 - 2024: *Introduction to Deep Learning*, Budapest Semesters in Mathematics (professor).
- 2019 - 2020: *Mathematics I*, BSc of Chemical Engineering, half course (assistant professor).
- 2018 - 2019: *Mathematics I*, BSc of Enviromental Science (assistant professor).
- 2017 - 2018: *Algebra I*, BSc of Physics (assistant professor).

SERVICE

Referee for: *Analysis and PDE*, *AISTATS 2022*, *AISTATS 2024* and *The Ramanujan Journal.*

Reviewer for: zbMATH.

LANGUAGES

- Human: English and Spanish.
- Programming: Python (including Pytorch), C, Java, SQL, Matlab, and R.