

Boulos El Hilany

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Born: 01 March 1990
Nationality: Lebanese

Work and Education

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| 2021 – 2023 May – Apr. | Postdoc Grant: “Classifying polynomial maps by means of polyhedral geometry” <i>Institute of Analysis and Algebra, TU Braunschweig.</i> |
| 2020 – 2021 Apr. – Apr. | Postdoc working with Niels LUBBES <i>Johann Radon Institute for Computational and Applied Mathematics, Linz.</i> |
| 2018 – 2020 Dec. – Apr. | Postdoc <i>Institute of Mathematics, Polish Academy of Sciences, Warsaw.</i> |
| 2017–2018 Dec. – Nov. | Visiting researcher <i>Max Planck Institute for Mathematics, Bonn.</i> |
| 2016–2017 May – Nov. | Postdoc working with Johannes RAU <i>University of Tübingen, Faculty of Mathematics.</i> |
| 2013–2016 | PhD , adv: Frédéric BIHAN, “Tropical Geometry and Polynomial Systems” <i>LAMA, Université Savoie Mont Blanc, Le Bourget-du-Lac</i> |
| 2013 (2 months) | Masters thesis “Tropical Curves and Amoebas” <i>LAMA, Université Savoie Mont Blanc, Le Bourget-du-Lac</i> |
| 2012–2013 | Masters in pure mathematics; Riemannian Geometry, <i>Lebanese University, École Doctorale de Sciences et Technologies.</i> |

Grants

I will be working in the Institute of Analysis and Algebra at TU Braunschweig as part of my two-year *Walter Benjamins Programme DFG* grant **EL 1092/1-1**, titled “Classifying polynomial maps by means of polyhedral geometry”.

Research Topics

Topology of Polynomial Maps – Real Algebraic Geometry – Fewnomial Theory – Tropical Geometry
– Polyhedral Geometry – Real Hurwitz Numbers

Publications list

- *A note on generic polynomial maps having a fiber of maximal dimension*, arXiv:1910.01333 (2020). To appear in Colloquium Mathematicum.
- *Signed counts of real simple rational functions*, with Johannes Rau. doi.org/10.1007/s10801-019-00906-6, Journal of Algebraic Combinatorics (2019),
- *Constructing polynomial systems with many positive solutions using tropical geometry* doi.org/10.1007/s13163-017-0254-1 Revista Matematica Complutense (2018), Volume **31**, Issue **2**, pp. 525—544,
- *Characterization of circuits supporting polynomial systems with the maximal number of positive solutions*. doi.org/10.1007/s00454-017-9897-4 Journal of Discrete & Computational Geometry (2017), Vol. **58**, No. **2**, pp. 355–370,
- *A sharp bound on the number of real intersection points of a sparse plane curve with a line*. with Frédéric Bihan doi.org/10.1016/j.jsc.2016.12.003 Journal of Symbolic Computations (2017), Vol. **81**, pp. 88–96.

Recent submissions

- *Computing efficiently the non-properness set of polynomial maps on the plane* with Elias Tsigaridas, arXiv:2101.05245 (2020)
- *Counting isolated points outside the image of a polynomial map*, arXiv:1909.08339 (2019)
- *Describing the Jelonek set of polynomial maps via Newton polytopes*, arXiv:1909.07016 (2019)

Selected Talks

- 2021** **Computing efficiently the non-properness set of polynomial maps on the plane**,
 - Singularity Theory Seminar, *Universidade Federal do Ceará, Brazil*
- 2020** **Counting isolated points outside the image of a polynomial map**,
 - Discrete Mathematics Research Seminar, *RICAM, Linz*
 - Applied Algebra and Analysis online seminar, *TU Braunschweig*
 - Geometry team seminar, *LAMA, Université Savoie Mont Blanc, Chambéry*.
- 2019** **On polynomial maps having fibers of maximal dimension**,
 - Geometry and Singularity Theory seminar, *IMPAN Warsaw*
- 2019** **Describing the Jelonek set of polynomial maps via Newton polytopes**,
 - Gdańsk-Kraków-Lódź-Warszawa Seminar in Singularity Theory, *Kraków*
 - Einstein workshop on Real Applied Algebraic Geometry, *TU Berlin*.
 - Algebra group seminar, *University of Tübingen*.
- 2019** **Characterizing circuits supporting polynomial systems having, the maximal number of positive solutions**,
 - SIAM conference on Applied Algebraic Geometry, *Bern University*.
- 2018** **Belyi Theorem via dessins d'enfants**,
 - Working group on Grothendieck-Teichmüller groups, *MPIM, Bonn*.

- 2018–19** | **Signed counts of real simple rational functions,**
 - IMPANGA Seminar, *Mathematical Institute Polish Academy of Sciences, Warsaw.*
 - 6th Workshop on Combinatorics of Moduli Spaces, Cluster Algebras, and Topological Recursion, *Steklov Mathematical Institute, Moscow.*
 - ASGARD: Real algebraic geometry and tropical mathematics, *Oslo University.*
- 2017** | **The equations for the moduli space of n points on the line,**
Jul. | Image Processing and Computer Vision conference, *Tübingen University.*
- 2017** | **Topology of real K3 surfaces,**
– Reading Group on Real Algebraic Geometry, *Max Plank Institute MIS, Leipzig.*
- 2017–19** | **Constructing polynomial systems with many positive solutions using tropical geometry.**
 - Geometry and Topology of Singularities seminar, *IMPAN, Warsaw.*
 - Workshop on Tropical algebra and applications, *Mittag Leffler Institute, Sweden.*
 - Nonarchimedean and Tropical Geometry conference, *Universität Regensburg.*

Conferences/events co-organized

- 2021** | Workshop on *Real Algebraic and Convex Geometry*
(July) | TU Braunschweig
- 2017** | *Image Processing and Computer Vision.*
(July) | Eberhard Karls Universität Tübingen, Germany.
- 2015** | *Colloque Inter'Actions.*
(May) | Université Grenoble Alpes, France.

Recent events

- 2019** | *Einstein workshop on Real Applied Algebraic Geometry,*
Sep. | Technische Universität Berlin
- 2019** | *Curves and Surfaces, A History of Shapes,*
Sep. | Hotel Bellavista - Levico Terme, Italy
- 2019** | *SIAM conference on Applied Algebraic Geometry*
Jul. | Bern University.
- 2019** | *New Perspectives in Gromov-Witten Theory,*
Jun. | Institut de mathématiques de Jussieu.
- 2018** | *Tropical Geometry in Europe*
(Jul.) | Institut de mathématiques de Toulouse.
- 2018** | *Random matrices, maps, and gauge theories*
Jun. | ENS de Lyon.
- 2018** | *6-th Workshop on Combinatorics of Moduli Spaces, Cluster Algebras, and Topological Recursion.*
Jun. | Steklov Mathematical Institute, Moscow.
- 2018** | *Tropical Geometry, Amoebas and Polytopes research semester.*
Jan. | Mittag Leffler Institute.

Teaching activity

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| 2017 | Universität Tübingen <i>Teaching math assistant for refugees in Germany</i> , 15 hrs. |
| 2015-2016 | Université Savoie Mont Blanc. <i>Reinforcement math courses</i> , 20 hrs. Math 326, <i>Fourrier Series</i> , 25 hrs. Math 226, <i>Linear Algebra I</i> , 15 hrs. Math 121b, <i>Basic Calculus</i> , 55 hrs. |
| 2014-2015 | Math 611, <i>Inferential Statistics</i> , 30 hrs. Math 401, <i>Statistics and Probability</i> , 12 hrs. |

Languages

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| Arabic | Reading, Writing, Speaking: 1 st Native language. |
| Russian | Reading, Writing, Speaking: 2 nd Native language. |
| English | Reading, Writing, Speaking: Fluent. |
| French | Reading, Writing, Speaking: Fluent. |
| German | Reading, Writing, Speaking: Advanced. |
| Polish | Reading, Writing, Speaking: Basic. |