Yairon Cid-Ruiz

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CONTACT INFORMATION

Professional Address: Department of Mathematics, KU Leuven, Celestijnenlaan 200B, 3001 Leuven, Belgium.

EDUCATION

09/2016 - 08/2019 **Ph.D. in Mathematics**, *summa cum laude.*
Center: Universitat de Barcelona.
Advisor: Carlos D'Andrea

09/2015 - 08/2016 **Postgraduate Diploma Programme in Mathematics**, *top student prize.*
Center: Abdus Salam International Centre for Theoretical Physics (ICTP).
Advisor: Lothar Göttsche.

09/2009 - 07/2014 **Bachelor in Computer Science**, *summa cum laude.*
Center: Universidad Central "Marta Abreu" de las Villas (UCLV).
Advisor: Eberto Morgado.

WORK EXPERIENCE

08/2022 - Present **Postdoctoral researcher**, KU Leuven.

10/2020 - 07/2022 **Postdoctoral researcher**, Ghent University.

09/2019 - 09/2020 **Postdoctoral researcher**, Max Planck Institute for Mathematics in the Sciences.

09/2016 - 08/2019 **Early stage researcher**, Universitat de Barcelona.
PhD candidate in the ARCADES network (http://arcades-network.eu) under the Marie Skłodowska-Curie grant agreement No 675789.

09/2014 - 07/2015 **Graduate Teaching Assistant**, Universidad Central "Marta Abreu" de las Villas.

PUBLICATIONS & PREPRINTS

1. *"Bounding the degrees of a minimal μ-basis for a rational surface parametrization"*, J. Symbolic Comput. 95 (2019), 134-150, arXiv:1611.07506.
2. *"A D-module approach on the equations of the Rees algebra"*, to appear in J. Commut. Algebra, arXiv:1706.06215.
3. *"Regularity and Gröbner bases of the Rees algebra of edge ideals of bipartite graphs"*, Le Matematiche Vol 73 No 2 (2018), pp. 279–296, arXiv:1801.06731.
4. (with Sepehr Jafari, Beatrice Picone and Navid Nemati), *"Regularity of bicyclic graphs and their powers"*, J. Algebra Appl. Vol. 19, No. 03, 2050057 (2020), arXiv:1802.07202.
5. (with Laurent Busé and Carlos D'Andrea), *"Degree and birationality of multi-graded rational maps"*, Proc. Lond. Math. Soc. (3) 121 (2020) 743–787, arXiv:1805.05180.
6. "Multiplicity of the saturated special fiber ring of height two perfect ideals", Proc. Amer. Math. Soc. 148 (2020), no. 1, 59–70, arXiv:1807.03189.
7. (with Aron Simis), *"Degree of rational maps via specialization"*, International Mathematics Research Notices, rnaa183, arXiv:1901.06599.
8. *"Noetherian operators, primary submodules and symbolic powers"*, Collect. Math. 72, p. 175–202 (2021), arXiv:1909.07253.
9. (with Vivek Mukundan), *"Multiplicity of the saturated special fiber ring of height three Gorenstein ideals"*, Acta Mathematica Vietnamica 46, pp. 663–674 (2021), arXiv:1909.13633.
10. *"Mixed multiplicities and projective degrees of rational maps"*, J. Algebra 566 (2021), 136–162, arXiv:2001.00547.

11. (with Roser Homs and Bernd Sturmfels), *"Primary ideals and their differential equations"*, Foundations of Computational Mathematics 21, pp. 1363–1399 (2021), arXiv:2001.04700.
12. (with Marc Chardin and Aron Simis), *"Generic freeness of local cohomology and graded specialization"*, Transactions of the American Mathematical Society 375 (2022), no. 1, 87–109, arXiv:2002.12053.
13. (with Federico Castillo, Binglin Li, Jonathan Montaño and Naizhen Zhang), *"When are multidegrees positive?"*, Advances in Mathematics 374 (2020), 107382, arXiv:2005.07808.
14. (with Jonathan Montaño), *"Convex bodies and graded families of monomial ideals"*, To appear in Revista Matemática Iberoamericana, arXiv:2010.07918.
15. (with Jonathan Montaño), *"Mixed mulitplicities of graded families of ideals"*, Journal of Algebra 590 (2022) 394–412, arXiv:2010.11862.
16. *"Equations and multidegrees for inverse symmetric matrix pairs"*, Le Matematiche Vol. LXXVI (2021) - Issue II, pp. 369–381, arXiv:2011.04616.
17. (with Justin Chen, Marc Härkönen, Robert Krone and Anton Leykin), *"Noetherian Operators in Macaulay2"*, arXiv:2101.01002.
18. (with Bernd Sturmfels), *"Primary decomposition with differential operators"*, to appear in International Mathematics Research Notices, arXiv:2101.03643.
19. (with Justin Chen), *"Primary decomposition of modules: a computational differential approach"*, to appear in Journal of Pure and Applied Algebra, arXiv:2104.03385.
20. (with Fatemeh Mohammadi and Leonid Monin), *"Multigraded algebras and multigraded linear series"*, arXiv:2104.05397.
21. *"Fiber-full modules and a local freeness criterion for local cohomology modules"*, arXiv:2106.07777.
22. (with Ritvik Ramkumar), *"The fiber-full scheme"*, arXiv:2108.13986.
23. (with Federico Castillo, Fatemeh Mohammadi and Jonathan Montaño), *"Double Schubert polynomials do have saturated Newton polytopes"*, arXiv:2109.10299.
24. (with Oliver Clarke and Fatemeh Mohammadi), *"A study of nonlinear multiview varieties"*, arXiv:2112.06216.
25. (with Ritvik Ramkumar), *"A local study of the fiber-full scheme"*, arXiv:2202.06652.
26. (with Claudia Polini and Bernd Ulrich), *"Generalized Jouanolou duality, weakly Gorenstein rings, and applications to blowup algebras"*, arXiv:2205.03837.
27. (with Alessio Caminata and Aldo Conca), *"Multidegrees, prime ideals, and non-standard gradings"*, arXiv:2208.07238.

AWARDS & DISTINCTIONS

- Extraordinary Doctorate Award, Universitat de Barcelona, 2019.
- Winner of the top student prize in Mathematics in International Centre for Theoretical Physics, 2016.
- One of the 10 selected students in the Postgraduate Diploma Programme in Mathematics in International Centre for Theoretical Physics, 2015.
- Best graduate student in 2014 in the Universidad Central "Marta Abreu" de Las Villas, 2014.
- SILVER MEDAL in the XV Iberoamerican Mathematical Olympiad, 2012.
- BRONZE MEDAL in the XIII Iberoamerican Mathematical Olympiad, 2010.
- BRONZE MEDAL in the Caribbean Regional Final of the Latin American programming ACM-ICPC, 2012.

FELLOWSHIPS

- 10/2021 - 09/2024: Postdoctoral Fellowship Research Foundation Flanders (FWO), Ghent University, Ghent, Belgium.
- 09/2016 - 08/2019: Marie Skłodowska-Curie Fellowship, Universitat de Barcelona, Barcelona, Spain.
- 09/2015 - 08/2016: Awarded a fully funded scholarship to pursue the Postgraduate Diploma in Mathematics at ICTP, Trieste, Italy.

RESEARCH VISITS

- INRIA Sophia Antipolis, 6 months, 10/2017 – 03/2018, host: Lurent Busé.
- Johannes Kepler University Linz, 2 months, 10/2018 – 11/2018, host: Josef Schicho.
- Polictenico di Torino, 1 week, 05/11/2018 – 09/11/2018, host: Aron Simis.
- International Centre for Theoretical Physics, 1 week, 11/02/2019 – 15/02/2019, host: Tarig Abdelgadir.
- Universidad de Sevilla, 1 week, 22/04/2019 - 26/04/2019, host: Francisco Jesús Castro Jiménez.
- Notre Dame University & Purdue University, 1 month, 03/2022, hosts: Claudia Polini & Bernd Ulrich.
- University of Genova, 1 month, 07/2022, host: Aldo Conca.

INVITED TALKS

- *"Describing non-reduced schemes with differential operators"*, Workshop on Differential Algebra, MPI Leipzig, Germany, June 2022.
- *"Double Schubert polynomials do have saturated Newton polytopes"*, AMS 2022 Spring Western Virtual Sectional Meeting (online), May 2022.
- *"A local study of the fiber-full scheme"*, AMS Spring Central Virtual Sectional Meeting, Purdue University, USA, March 2022.
- *"Differential primary decomposition of modules"*, Congreso Bienal de la Real Sociedad Matemática Española 2022, Universidad de Castilla - La Mancha, Ciudad Real, Spain, January 2022.
- *"Double Schubert polynomials do have saturated Newton polytopes"*, Congreso Bienal de la Real Sociedad Matemática Española 2022, Universidad de Castilla - La Mancha, Ciudad Real, Spain, January 2022.
- *"An invitation to the fiber-full scheme"*, Seminar Number Theory and Algebraic Geometry, KU Leuven, Leuven, Belgium, November 2021.
- *"An invitation to the fiber-full scheme"*, Jornada de Jóvenes Doctores en Geometría Algebraica, Universitat de Barcelona, Barcelona, Spain, November 2021.
- *"The fiber-full scheme"*, Fellowship of the Ring seminar (online), October 2021.
- *"Convex bodies and graded families of ideals"*, Society for Industrial and Applied Mathematics, Applied Algebraic Geometry Conference (online), August 2021.
- *"Primary decomposition with differential operators"*, ICERM conference (online): D-modules, Group Actions, and Frobenius: Computing on Singularities, August 2021.
- *"Primary decomposition with differential operators"*, Simon Fraser University Number Theory and Algebraic Geometry Seminar (online), July 2021.
- *"Primary decomposition with differential operators"*, Mathematical Congress of the Americas (online), July 2021.
- *"Convex bodies and graded families of monomial ideals"*, IIT Bombay Virtual Commutative Algebra Seminar (online), July 2021.
- *"Multigraded algebras and multigraded linear series"*, Technische Universität Berlin (online), June 2021.
- *"Equations and multidegrees for inverse symmetric matrix pairs"*, Effective Methods in Algebraic Geometry MEGA 2021 (online), May 2021.
- *"Primary decomposition with differential operators"*, Seminari de Geometria Algebraica de Barcelona (online), April 2021.
- *"Primary ideals and differential operators"*, The MAX computer algebra seminar (online), February 2021.
- *"When are multidegrees positive?"*, Ghent Algebra and Geometry Seminars Weekly Research Seminars, Ghent, Belgium, November 2020.
- *"Ehrenpreis-Palamodov theorem in commutative algebra"*, Differential Operators in Commutative Algebra Seminar (online), July 2020.

- *"Specialization of graded modules and generic freeness of local cohomology"*, Nonlinear Algebra Seminar Online, March 2020.
- *"Noetherian operators, primary submodules and symbolic powers"*, V congreso de jóvenes investigadores RSME, Castellón, Spain, January 2020.
- *"Noetherian operators, primary submodules and symbolic powers"*, Algebra Seminar, Osnabrück, Germany, November 2019.
- *"Rational maps, syzygies and specialization"*, Seminar on Nonlinear Algebra, Leipzig, Germany, September 2019.
- *"Ehrenpreis – Palamodov Theorem"*, Second edition of the conference: Computing with D-modules, Leipzig, Germany, September 2019.
- *"Specialization of rational maps"*, Society for Industrial and Applied Mathematics, Applied Algebraic Geometry Conference, Bern, Switzerland, July 2019.
- *"Rational maps and syzygies"*, Seminario de Álgebra de la Universidad de Sevilla, Sevilla, Spain, April 2019.
- *"Saturated special fiber ring and rational maps"*, Seminari de Geometria Algebraica de Barcelona, Barcelona, Spain, March 2019.
- *"Saturated special fiber ring and rational maps"*, Mathematics Seminar, International Centre for Theoretical Physics, Italy, February 2019.
- *"Rational maps and the saturated special fiber ring"*, Joint Meeting of the Czech, Slovenian, Austrian, Slovak and Catalan Mathematical Societies, Bratislava, Slovakia, September 2018.
- *"Degree and birationality of multi-graded rational maps"*, ARCADES Doctoral School II and ESR Days in Barcelona, Barcelona, Spain, September 2018.
- *"Regularity and Gröbner bases of the Rees algebra of edge ideals of bipartite graphs"*, XVI Encuentro de Álgebra Computacional y Aplicaciones (EACA), Zaragoza, Spain, July 2018.
- *"Regularity of bicyclic graphs and their powers"*, IPPI Workshop 2018 (post-Pragmatic 2017 event), Turin, Italy, March 2018.
- *"Regularity and Gröbner bases of the Rees algebra of edge ideals of bipartite graphs"*, Journées Nationales de Calcul Formel, CIRM, Luminy, France, January 2018.
- *"A D-module approach on the equations of the Rees algebra"*, Séminaire d'algèbre, topologie et géométrie, University of Nice, France, November 2017.
- *"Bounding the degrees of a minimal μ-basis for a rational surface parametrization"*, Society for Industrial and Applied Mathematics, Applied Algebraic Geometry Conference, Atlanta, United States, August 2017.
- *"Bounding the degrees of a minimal μ-basis for a rational surface parametrization"*, Effective Methods in Algebraic Geometry MEGA 2017, Nice, France, June 2017.
- *"Bounding the degrees of a minimal μ-basis for a rational surface parametrization"*, Seminari de Geometria Algebraica de Barcelona, Barcelona, Spain, March 2017.

CONFERENCES & WORKSHOPS

- Workshop on Differential Algebra, MPI Leipzig, Germany, June 2022.
- Mathematical Congress of the Americas 2021 (online), July 2021.
- Summer School on Randomness and Learning in Non-Linear Algebra, Leipzig, Germany, July 2019.
- Thematic Program in Commutative Algebra and its Interaction with Algebraic Geometry. In Honor of Bernd Ulrich. Notre Dame University, United States, June 2019.
- Learning Week III in ARCADES, Nice, France, March 2019.
- Second ARCADES Software & Industrial Workshop, Cambridge, UK, January 2019.
- Frobenius Action in Commutative Algebra: Recent Developments, Barcelona, Spain, January 2019.
- Macaulay2 Workshop, Leipzig, Germany, June 2018.
- Learning Week II in ARCADES, Nice, France, March 2018.
- Workshop on Commutative Algebra, Syzygies and Singularities, Nice, France, December 2017.

- First Software & Industrial Workshop, and Midterm Review ARCADES, Athens, Greece, November 2017.
- Research school in Algebraic Geometry and Commutative Algebra, Pragmatic 2017, Catania, Italy, June 2017.
- Learning Week I in Algebraic Representations in Computer-Aided Design for complEx Shapes (ARCADES), Nice, France, March 2017.
- 1st Doctoral School ARCADES, Oslo, Norway, December 2016.
- Workshop in Algebra, Algebraic Geometry, Algebraic Topology and Applications sponsored by Centro de Investigaciones en Matemáticas(CIMAT, Guanajato, México) in Ciego de Avila, Cuba, 2014.

ORGANIZATIONAL ACTIVITIES

- Member of the Organizing Committee of the minisymposia *"Differential Equations in Algebraic Geometry and Beyond"*, 2021 SIAM Conference on Applied Algebraic Geometry (online), August 2021.
- Member of the Organizing Committee of the minisymposia *"Syzygies and applications to Geometry"*, 2019 SIAM Conference on Applied Algebraic Geometry, Bern, Switzerland, July 2019.

TEACHING EXPERIENCE

Universidad Central "Marta Abreu" de las Villas	09/2014 – 07/2015
Topology	Fall 2014
Differential Geometry of Curves and Surfaces	Spring 2015
Ghent University	10/2020 –
Calculus	Spring 2021

LANGUAGES

Spanish: Mother tongue.
English: Fluent.
Dutch: Intermediate (level B1).

COMPUTER SKILLS

C/C++, JAVA, LaTeX, Linux, Wolfram Mathematica, MACAULAY2, SINGULAR.