

# Yairon Cid-Ruiz

Nationality: Spanish | Cuban; Date of Birth: 26/08/1990

E-mail: Yairon.CidRuiz@UGent.be

Website: <https://ycid.github.io>

## CONTACT INFORMATION

Professional Address: Department of Mathematics: Algebra and Geometry, Ghent University,  
Krijgslaan 281 – S25, 9000 Gent, 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

10/2020 - Present **Postdoc**, Ghent University.

09/2019 - 09/2020 **Postdoc**, 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  $\mu$ -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”, to appear in Acta Mathematica Vietnamica, 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”, to appear in Foundations of Computational Mathematics, arXiv:2001.04700.

12. (with Marc Chardin and Aron Simis), “*Generic freeness of local cohomology and graded specialization*”, to appear in Transactions of the American Mathematical Society, arXiv:2002.12053.
13. (with Federico Castillo, Binglin Li, Jonathan Montaña and Naizhen Zhang), “*When are multidegrees positive?*”, to appear in Advances in Mathematics, arXiv:2005.07808.
14. (with Jonathan Montaña), “*Convex bodies and graded families of monomial ideals*”, arXiv:2010.07918.
15. (with Jonathan Montaña), “*Mixed multiplicities of graded families of ideals*”, arXiv:2010.11862.
16. “*Equations and multidegrees for inverse symmetric matrix pairs*”, to appear in Le Matematiche, 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*”, arXiv:2101.03643.
19. (with Justin Chen), “*Primary decomposition of modules: a computational differential approach*”, 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.

## 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.

## 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.
- Politecnico 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.

## FELLOWSHIPS

- 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.

## INVITED TALKS

- “*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.
- “*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  $\mu$ -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  $\mu$ -basis for a rational surface parametrization*”, Effective Methods in Algebraic Geometry MEGA 2017, Nice, France, June 2017.
- “*Bounding the degrees of a minimal  $\mu$ -basis for a rational surface parametrization*”, Seminari de Geometria Algebraica de Barcelona, Barcelona, Spain, March 2017.

## CONFERENCES & WORKSHOPS

- 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.

## LANGUAGES

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

## COMPUTER SKILLS

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