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EDUCATION

- Doctor in Mathematical Sciences of the National University of Colombia (Advisor Prof. Dr. Juan D. Vélez) in cooperation with the University of Osnabrück (Advisor Prof. Dr. rer. nat. Holger Brenner) under a DAAD-Sandwich scholarship. Title of the Thesis: “Homological Conjectures, Closure Operations, Forcing Algebras and Vector Bundles”. September 2013.
- Magister in Mathematics. Magister’s Thesis title (translation): “Hilbert’s Tenth Problem and some related Questions”. National University of Colombia, September 2007.
- Diploma in Mathematics. Diploma’s Work title: (translation): “The Prime Number Theorem and some Equivalences”. National University of Colombia, September 2004.

MAIN RESEARCH INTERESTS

Artificial (Mathematical) Intelligence, (Computational) Conceptual Creation, Computational and Cognitive Mathematics, Metamathematics, Fundamental Cognitive Mechanisms for Scientific Creation, (Global and Cognitively-Inspired) Proof Theory, Cognitive Science, Homological Conjectures, (Experimental Natural) Consciousness, Philosophy of Human and Artificial Intelligence, (Computational and Cognitively-Inspired) Foundations of Mathematics, Logical Foundations of Law and (logical aspects of) Quantum Mechanics.

CURRENT AND FORMER RESEARCH AFFILIATIONS

- Current Position: Researcher of the Algebra Group at the Institute of Discrete Mathematics and Geometry of Vienna University of Technology. September 2018-. Professor-Researcher at the University Pascual Bravo, Medellín. Founder of the Network ARMAINTE and the multidisciplinary meta-project Artificial Mathematical Intelligence, which is the biggest initiative in Europe-Latin America for creating AI focused on mathematical invention/creation and related scientific research.
<http://www.ArtificialMathematicalIntelligence.com>
- Former member of the Computational Logic Research Group at the Institute of Discrete Mathematics and Geometry of Vienna University of Technology. March 2017-August 2018.
- Former member of the Austrian-project ‘Structure and Expressivity: The Mathematical Foundations of Inductive Reasoning, supported by the Vienna Science and Technology Fund with 1,5 millions Euro, March 2017-August 2018.
- Former member of the Artificial Intelligence Group of the Institute of Cognitive Sciences of the University of Osnabrück. August 2013-February 2017.
- Former researcher of the EU-project COINVENT (Concept Invention Theory) supported by the European Commission with around 2,1 millions Euro, October 2013-September 2016.
http://www.coinvent-project.eu/en/project_description.html.
- Invited researcher at the Informatics Forum of the University of Edinburgh. Collaborators Alan Smail and Jacques Fleuriot. April 2014.
- Former member of the Research Group “Algebra and Discrete Mathematics” at the Institute of Mathematics of the University of Osnabrück. October 2010-July 2013.

- Former member of the Research Group “Arithmetic Geometry” at the Institute of Mathematics of the University of Heidelberg. October 2007-April 2008.
- Former member and active research collaborator at the Research Group in Commutative Algebra, Algebraic Geometry, and Theoretical and Mathematical Physics of the School of Mathematics of the National University of Colombia in Medellín. July 2008-September 2013.

PRIZES AND SCHOLARSHIPS

- Winner of the Best Abstract and invited as a Keynote Speaker. 3th Curriculum Workshop of the (European) Human Brain Project, Graz, Austria. September 26-27 of 2019.
- Scholar of the DAAD (German Academic Exchange Service) for Ph.D. Studies 2008-2012.
- Holder of the Scholarship: Outstanding Postgraduate Students, National University of Colombia, During the Ph.D. studies in Mathematics 2008-2012.
- Holder of the Scholarship: Outstanding Postgraduate Students, National University of Colombia, During the Master’s studies in Mathematics 2005-2006.
- Full Scholarship for Academic Excellence, National University of Colombia, as undergraduate student during the Semesters 01 and 02 of 2000, 01 of 2001, and 01 of 2002.
- Leader of the Olympic Mathematical Team of the National University of Colombia at the 1-th CIIM (Iberoamerican Inter-universities Mathematical Olympiad). The Team obtained two Bronze Medals. Organizers: Colombian Olympiad of Mathematics. Girardot, Colombia 2009.
- Honorable Mention at the 11-th IMC (International Mathematical Competition for University Students). Organizers: University College London, Saints Cyril and Methodius University, Skopje (Macedonia), July 2004.
- Bronze Medalist at the 6-th Iberoamerican Mathematics Olympiad for University Students. Organizers: Brazilian Olympiad of Mathematics. September 2003.
- Bronze Medalist at the 5-th Iberoamerican Mathematics Olympiad for University Students. Organizers: Brazilian Olympiad of Mathematics. September 2002.
- Outstanding Participation (top 10 at national level) in the 6-th Colombian Mathematics Olympiad for University Students. Organizers: Colombian Olympiad of Mathematics and Colombian Society of Mathematics. December 2002.
- Outstanding Participation (top 10 at national level) in the 5-th Colombian Mathematics Olympiad for University Students. Organizers: Colombian Olympiad of Mathematics and Colombian Society of Mathematics. December 2001.

PUBLICATIONS

In Peer-reviewed Journals.

- *Artificially Hydrogen Molecule in vertically stacked $Ga_{1-x}Al_xAs$ nanoscale rings: Structural and external Probes Effects in their quantum levels.* Joint with J. Marín, M. Fulla, Y. Suaza, I. Rivera and J. Castrillón. *Physica E: Low-Dimensional Systems and Nanostructures*, 117, 113765 (2020) (To appear).
- *A General Version of the Nullstellensatz for Arbitrary Fields.* Joint with Juan D. Vélez and Edisson Gallego, *Open Mathematics* 17, 556-558(2019). Arxiv preprint <https://arxiv.org/pdf/1708.04463.pdf>
- *Category-based Co-Generation of Basic Results and Concepts in Algebra and Number Theory: Containment-Division and Goldbach Rings.* Joint with Marlon Fulla, Ismael Rivera, Juan D. Vélez and Edisson Gallego, *JP Journal of Algebra, Number Theory and Applications* Vol 40(5) pp. 887-901 (2018).

- *On Positive-Characteristic Semi-parametric Local Liftings of Varieties over finitely generated \mathbb{Q} -Algebras*. Joint with Edison Gallego and Juan D. Vélez. Results in Mathematics Vol 72(1), pp. 937-945 (2017).
<https://link.springer.com/content/pdf/10.1007%2Fs00025-017-0691-7.pdf>
- *Theory Blending: Extended Algorithmic Aspects and Examples*. Joint with M. Martinez, A. M. H. Abdel-Fattah, U. Krumnack, A. Smail, T. Besold, A. Pease, M. Schmidt, M. Guhe and K.-U. Kühnberger. Annals of Mathematics and Artificial Intelligence, pp. 1-25, (2016).
<http://link.springer.com/article/10.1007/s10472-016-9505-y>
- *Normality and Related Properties of Forcing Algebras (Joint with Holger Brenner)*. Communications in Algebra. Volume 44, Issue 11, pp. 4769-4793, (2016).
<http://www.tandfonline.com/eprint/jp4prBdiQykbGbhrC4FE/full>
Arxiv's version: <https://arxiv.org/pdf/1707.08605.pdf>
- *The Direct Summand Conjecture for some bi-generated extensions and an asymptotic Version of Koh's Conjecture*. Joint with Edison Gallego and Juan D. Vélez. Beiträge zur Algebra und Geometrie (Contributions in Algebra and Geometry) pp. 1-16. (2016).
<http://link.springer.com/article/10.1007/s13366-015-0277-z>
- *On the Connectedness of the Spectrum of Forcing Algebras*. Joint with Holger Brenner. Revista Colombiana de Matemáticas. Vol 48(1), Pag. 1-19 (2014).
<http://www.scielo.org.co/pdf/rcm/v48n1/v48n1a01.pdf>
- *An Explicit Set of Isolated Points in \mathbb{R} with Uncountable Closure*, Matemáticas: Enseñanza Universitaria, Escuela Regional de Matemáticas, Vol. XV, No 2, December 2007, Notas 145-147.
<http://www.redalyc.org/articulo.oa?id=46815211>
- *A more direct Proof of Gerschgorin's Theorem*, Matemáticas: Enseñanza Universitaria, Escuela Regional de Matemáticas, Vol. XIV, No 2, December 2006, Notas 119-122.
<http://revistaerm.univalle.edu.co/VolXIV2/autor7.pdf>

Book Chapters (and Books).

- *General Introduction to the Artificial Mathematical Intelligence Program*. In Artificial Mathematical Intelligence: Philosophical, Metamathematical, Physical and Cognitive Foundations. Danny A. J. Gomez-Ramirez. In the Series: Mathematics in Mind, Springer International Publishing, Cham (2019). To appear.¹
- *General Considerations for the New Cognitive Foundations' Program*. In Artificial Mathematical Intelligence: Philosophical, Metamathematical, Physical and Cognitive Foundations. Danny A. J. Gomez-Ramirez. In the Series: Mathematics in Mind, Springer International Publishing, Cham (2019). To appear.
- *Towards the (Cognitive) Reality of Mathematics and the Mathematics of (Cognitive) Reality*. In Artificial Mathematical Intelligence: Philosophical, Metamathematical, Physical and Cognitive Foundations. Danny A. J. Gomez-Ramirez. In the Series: Mathematics in Mind, Springer International Publishing, Cham (2019). To appear.
- *The Physical Numbers*. In Artificial Mathematical Intelligence: Philosophical, Metamathematical, Physical and Cognitive Foundations. Danny A. J. Gomez-Ramirez. In the Series: Mathematics in Mind, Springer International Publishing, Cham (2019). To appear.
- *Dathematics*. In Artificial Mathematical Intelligence: Philosophical, Metamathematical, Physical and Cognitive Foundations. Danny A. J. Gomez-Ramirez. In the Series: Mathematics in Mind, Springer International Publishing, Cham (2019). To appear. Preprint with a previous version

¹Due to the single importance of each of the chapters of this book, I show each of them separately in this section of my publications. The main reason is that most of them have the same relevance that a standard research article.

- <https://arxiv.org/pdf/1804.02439.pdf>
- *Conceptual Blending in Mathematical Creation/Invention*. In Artificial Mathematical Intelligence: Philosophical, Metamathematical, Physical and Cognitive Foundations. Danny A. J. Gomez-Ramirez. In the Series: Mathematics in Mind, Springer International Publishing, Cham (2019). To appear.
 - *Formal Analogical Reasoning in Concrete Mathematical Research*. In Artificial Mathematical Intelligence: Philosophical, Metamathematical, Physical and Cognitive Foundations. Danny A. J. Gomez-Ramirez. In the Series: Mathematics in Mind, Springer International Publishing, Cham (2019). To appear.
 - *Conceptual Substratum*. In Artificial Mathematical Intelligence: Philosophical, Metamathematical, Physical and Cognitive Foundations. Danny A. J. Gomez-Ramirez. In the Series: Mathematics in Mind, Springer International Publishing, Cham (2019). To appear.
 - *Global Taxonomy of the most Fundamental Cognitive Mechanisms used in Mathematical Creation/Invention*. In Artificial Mathematical Intelligence: Philosophical, Metamathematical, Physical and Cognitive Foundations. Danny A. J. Gomez-Ramirez. In the Series: Mathematics in Mind, Springer International Publishing, Cham (2019). To appear.
 - *Meta-Modeling of Classic and Modern Mathematical Proofs and Concepts*. In Artificial Mathematical Intelligence: Philosophical, Metamathematical, Physical and Cognitive Foundations. Danny A. J. Gomez-Ramirez. In the Series: Mathematics in Mind, Springer International Publishing, Cham (2019). To appear.
 - *The most Outstanding Challenges towards Global AMI and its Plausible Extensions*. In Artificial Mathematical Intelligence: Philosophical, Metamathematical, Physical and Cognitive Foundations. Danny A. J. Gomez-Ramirez. In the Series: Mathematics in Mind, Springer International Publishing, Cham (2019). To appear.
 - *Una Aproximación Multidisciplinaria hacia la formalización del Substrato Ontológico-Natural Local de las Estructuras Matemáticas*. Joint with J. P. Cardona-Buitrago. In A. F. Suarez, Ed. Logos y Filosofía: Temas y Debates Contemporáneos. In Series Señales, Publisher Editorial Bonaventuriana, 2019 (to appear).
 - *Formal Conceptual Blending in the (Co-)Invention of Pure Mathematics*. Joint with Alan Smaill. In Confalonieri R., Pease A., Schorlemmer M. eds. Concept Invention: Foundations, Implementations, Social Aspects and Applications. In Cognitive Technologies (Series). Springer (2018).
<https://rd.springer.com/book/10.1007%2F978-3-319-65602-1>
 - *Conceptual Blending in DOL, Evaluating Consistency, Conflict Resolution*. Joint with Michael Codescu, Fabian Neubaus, Till Mossakowski and Oliver Kutz. In Confalonieri R., Pease A., Schorlemmer M. eds. Concept Invention: Foundations, Implementations, Social Aspects and Applications. In Cognitive Technologies (Series). Springer (2018).
<https://rd.springer.com/book/10.1007%2F978-3-319-65602-1>

In Conference Proceedings.

- *Towards a Computational Framework for Function-Driven Concept Invention*. Joint with Nico Potyka, D. and Kai-Uwe. Kuhnberger. In Lecture Notes in Artificial Intelligence 9782, Steunebrink et al. (Eds.). Springer, Cham (2016).
http://link.springer.com/chapter/10.1007%2F978-3-319-41649-6_21
- *Conceptual Blending as a meta-generator of mathematical concepts: Prime Ideals and Dedekind Domains as a Blend*. T. Besold, K.-U. Kuehnberger, M. Schorlemmer and Alan Smaill (eds.). Kuehnberger K.-U., Koenig P. and Walter, S. (series eds.). Proceedings of the workshop on Computational Creativity, Concept Invention, and General Intelligence 2015,

C3GI. Institute of Cognitive Sciences. Publications of the Intitute of Cognitive Sciences, Osnabrueck, PICS series Vol. 2, (2015).

https://802fb1a8-d018-4726-8637-dbe483046deb.filesusr.com/ugd/8ee469_c6687d2c9e814a571.pdf

- *The Role of Blending in mathematical invention.* Joint with F. Bou, M. Schorlemmer, J. Corneli, E. Maclein and A. Smail and A Pease. Proceedings of the Sixth International Conference on Computational Creativity (ICCC). S. Colton et. al., eds. Park City, Utah, June 29-July 2, 2015. Publisher: Brigham Young University, Provo, Utah. pp. 55-62, (2015).

http://computationalcreativity.net/iccc2015/proceedings/3_2Bou.pdf

Submitted Articles and Similar Works.

- *On the Topological Interior of the Finitely-Generated Locus of a Special Kind of Frobenius Algebra.* Joint with Edison Gallego and Juan D. Vélez (2019).
- *Functional Conceptual Substratum as a New Cognitive Mechanism for Mathematical Creation.* Joint with Stefan Hetzl, (2019).

Arxiv preprint: <https://arxiv.org/pdf/1710.04022.pdf>

Online Preprint:

https://docs.wixstatic.com/ugd/8ee469_4f9e430c9f9b4770ac42a2ebe1df9bab.pdf

- *Towards an Homological Generalization of the Direct Summand Theorem.* Joint with J. D. Vélez, (under review) (2019).

Arxiv preprint: <https://arxiv.org/pdf/1707.09936.pdf>

- *On Preservation Properties and an Algebraic Characterization of Some Stronger Forms of the Noetherian Condition.* Joint with Edison Gallego and Juan D. Vlez, (under review) (2019). 2018. Arxiv preprint: <https://arxiv.org/pdf/1709.02748.pdf>

- *Towards a General Many-sorted Formal Framework for Describing Certain kinds of Legal Statues.* Joint with Egil Nordqvist, (under review) (2019). Online Preprint:

https://docs.wixstatic.com/ugd/8ee469_b3349a50347244b596a380def96ab372.pdf

- *Towards an Experimental Science of Natural Consciousness.* Joint with Renato Garita and Franzisca Becker, (under review) (2019). Online Preprint:

https://docs.wixstatic.com/ugd/8ee469_a2b6fca8a0094fb3957a374d74e0ecce.pdf

- *Artificial Co-creative Generation of the Notion of Topological Group through Categorical Conceptual Blending.* Joint with Yoe Herrera-Jaramillo and Florian Geismann, (under review) (2019). Online Preprint:

https://docs.wixstatic.com/ugd/8ee469_9af2732902744556abf2b0e61e563e5e.pdf

- *A New Multiple Intelligence Test for Artificial General Intelligence.* Joint with Judith Kieninger (under review) (2019). Online Preprint:

https://docs.wixstatic.com/ugd/8ee469_6259e1620d6e499dae4372879ce1899d.pdf

Books in Preparation.

- *A Modern View of Relativity: A Rigorous Introduction for Mathematicians.* Joint with Juan D. Velez, Camilo Arias, and Alexander Quintero, (2019).

Online Initial Preprint

https://docs.wixstatic.com/ugd/8ee469_99e55ce20aab486da5853febb3f2cc89.pdf

Additional Preprints and Monographies.

- *Containment-Division Rings and New Characterizations of Dedekind Domains.* Joint with Juan D. Vélez and Edison Gallego, (2017).

Arxiv preprint: <https://arxiv.org/pdf/1708.00532.pdf>

- *Homological Conjectures, Closure Operations, Forcing Algebras and Vector Bundles*. Ph.D. Thesis. National University of Colombia in cooperation with the University of Osnabrück. (2013).

https://docs.wixstatic.com/ugd/8ee469_5815c11af3e743afabd8b9923835623e.pdf

Posters.

- Towards a coherent ethical foundation for the multidisciplinary program: Artificial Mathematical Intelligence. Joint with M. Fulla, I. Rivera and J. L. Palacio. 3th Curriculum Workshop of the (European) Human Brain Project, Graz, Austria. September 26-27 of 2019.
- Respuesta óptica de un donador en un nanodisco de $Ga_{1-x}Al_xAs$. Joint with J. L. Palacio, E. Giraldo, G. L. Miranda, I. Rivera and M. Fulla. XXVIII Colombian Congress of Physics ‘Physics embedded in the Periodic Table’. September 9-12 of 2019, Pereira, Colombia.
- Propiedades electro-ópticas de un complejo ionizado confinado en un nanocono de $Ga_{1-x}Al_xAs$. Joint with J. L. Palacio, E. Giraldo, G. L. Miranda, I. Rivera and M. Fulla. XXVIII Colombian Congress of Physics ‘Physics embedded in the Periodic Table’. September 9-12 of 2019, Pereira, Colombia.
- Electro-Optical Properties of an Artificial Molecule Confined in Self-Assembled $Ga_{1-x}Al_xAs$ Nanocone. Joint with J. L. Palacio, E. Giraldo, G. L. Miranda, J. H. Marn, I. E. Rivera y M. R. Fulla. The 5th International Conference on the Physics of Optical Materials and Devices (ICOM), Igalo (Montenegro. August 27-31 of 2018.
- Blending in mathematical invention. Joint with F. Bou, M. Schorlemmer, J. Corneli, E. Maclellin and A. Smaill and A Pease. COINVENT, Seventh Framework Programm, 2015. Exposed on “Show, Tell, Imagine: A day to explore computational creativity together”. PROSECCO CONTACT FORUM. The Octagon, Queen Mary, University of London. April 9 of 2015

SELECTED SCIENTIFIC TALKS AND RELATED EVENTS

- “Foundations of Human and Artificial Intelligence: Introduction to Machine Learning”. Main speaker, with Alex Narvaes. Intensive (one week) Bootcamp. Co-organized by the Universidad Católica del Norte, Cedalc and ARMAINTE, Santa Rosa de Osos, Antioquia, Colombia. December 9-13 of 2019.
- “On Preservation Properties and a Special Algebraic Characterization of Some Stronger Forms of the Noetherian Condition”. With E. Gallego and J. D. Vélez. 1-st Bienal Internacional Covalente, University Francisco de Paula Santander. Cúcuta, Colombia. November 28-30 of 2019.
- “Metamathematical Cognitively-inspired Modelation of highly Sophisticated Mathematical Notions based on Categorical Conceptual Blending: Topological Groups”. With Yoe A. Herrera and F. Gaussman. 1-st Bienal Internacional Covalente, University Francisco de Paula Santander. Cúcuta, Colombia. November 28-30 of 2019.
- “How the fulfillment of artificial mathematical intelligence will shift the working purpose of formal researchers: A meta-analysis by means of the Human Values and Control’s (Asilomar) principles”. 3th Curriculum Workshop of the (European) Human Brain Project, Graz, Austria. September 26-27 of 2019.
- “Fundamental Pillars for the Creation of Artificial Co-Creative Mathematical Agents or Artificial Mathematical Intelligence”. Talk given at the Institutional Mathematical Colloquium of University of Antioquia, Medellín, Colombia. May 24 of 2019.

- “Towards Artificial Mathematical Intelligence and on the Foundations of Cognitive Metamathematics”. Talk given at the Science Complexity Hub SCH Vienna, Vienna, Austria, August 24 of 2018.
- “Artificial Mathematical Intelligence”. Plenary Talk given at the XIII International Symposium of Energies, Medellín, September 28 of 2017.
- “The Physical Numbers: Towards a Formal Physical Refinement of the Most Fundamental Numerical Systems”. Seminar of Physical Sciences of Eafit University, Medellín, Colombia, September 27 of 2017.
- “Functional Conceptual Substratum as a New Cognitive Mechanism for Mathematical Creation/Invention: Towards Artificial Mathematical Intelligence”. Institutional Mathematical Colloquium of University of Antioquia, Medellín, Colombia. September 26 of 2017.
- “Towards Artificial Mathematical Intelligence”. Talk given at the Seminar of the Research Group IMAGE of the Informatics Faculty of the University of Los Andes, Bogotá, Colombia. October 28, 2017.
- “Dathematics: a Meta-Isomorphic Version of Classic Mathematics based on Proper Classes”. Talk given at the Logic Colloquium (Annual European summer meeting of the Association of Symbolic Logic). Stockholm, Sweden. August 14, 2017.
- “Cognitively-inspired Formal Models of Scientific Creation”. J6’ Spring School for Studies on Intelligence and Cognition. The Joint Exploratory Society for Interdisciplinary and Cognitive Studies (JESICS). Cairo, Egypt. March 30, 2017.
- “Towards a General Taxonomy and Meta-Formalization of the Seminal Cognitive Mechanisms used in Mathematical Concept Invention”. Talk given at the Colloquium of the Theory and Logic Group of the Faculty of Informatics of the Vienna University of Technology. Vienna, Austria. November 23, 2016.
- “A cognitively-Inspired Reformulation of Meta-Mathematics”. Zif Workshop From Computational Creativity To Creativity Science. ZIF Center for Interdisciplinary Research (Bielefeld) in Cooperation with the University of Osnabrück, Germany. September 22, 2016.
- “Towards a Cognitively Inspired Physical Philosophy of Nature”. Talk at the Institute of Philosophy of the University of Antioquia, Medellín, Colombia. September 9 of 2016.
- “Meta-Mathematical Models of the Basic Creative Mechanisms used in the Mathematical Research” (Original title: Modelos Meta-Matemáticos de los Mecanismos Creativos Básicos usados en la Investigación Matemática). Talk at the Department of Mathematics of the National University of Colombia, Manizales, Colombia. September 8 of 2016.
- “Towards a Computational and Cognitively-inspired Meta-Theory for a Universal Logic Formalization of the Decidable Mathematics” (Original Title: Hacia una Meta-Teoría Computacional y Cognitivamente inspirada para la Formalización Lógica Universal de las Matemáticas Decidibles). Institutional Mathematical Colloquium of University of Antioquia, Medellín, Colombia. August 29 of 2016.
- “Logic-Categorical Meta-Models of the Conceptual Creation in Mathematics” (Original Title: Meta-Modelos Lógico-Categoricos de la Creación Conceptual en Matemáticas). Talk given at the Logic Seminar of the University of Los Andes. Bogotá, Colombia. August 25 of 2016.
- “Creativity, Conceptual Blending, Mathematics, Consciousness, Human and Artificial Intelligence” (Original Title: Creatividad, Fusión Conceptual, Matemáticas, Conciencia, Inteligencia Humana y Artificial). Talk at the faculty of Mathematics and Physics of Unillanos University. Villavicencio, Colombia. December 18 of 2015.

- “Towards the Classification of the Metagenerators of Mathematical Theories: Formal Conceptual Blending”. Seminar of Logic and Computation. EAFIT University. Medellín. December 16 of 2016.
- “The Reality of Mathematics and the Mathematics of Reality” (Original title: La realidad de las matemáticas y las matemáticas de la realidad). Public Library Piloto BPP. Conference open to the general public in Medellín. August 24 of 2015.
- “Toward a Universal Model of the Mathematical Creation” (Original title: Hacia un modelo universal de la creación matemática). Scientific Talk given at the Metropolitan Institute of Technology ITM. Medellín, August 24 of 2015.
- “How does our mind create new mathematical concepts? Toward a Meta-formalization of the Mathematical Creation” (Original title: Como crea nuestra mente nuevos conceptos matemáticos? Hacia una metaformalización de la creación matemática). Mathematical Colloquium of the School of Mathematics of the National University of Colombia in Medellín, August 24 of 2015.
- “Conceptual Blending as a meta-generator of mathematical concepts: Prime Ideals and Dedekind Domains as a Blend”. Contributing speaker at the 5-th World Congress on Universal Logic, UNILOG’15. Istanbul, Turkey. June 26 of 2015.
- “How much of pure mathematics is algorithmic? Toward the Construction of an essentially universal solver of mathematical conjectures” (Original Title: Cuanta matemática pura es algorítmica? Hacia la construcción de un Resolvedor Esencialmente Universal de Conjeturas Matemáticas) Mathematical Colloquium of the School of Mathematics of the National University of Colombia in Medellín, December 19 of 2014.
- Speaker and organizer of the 1-day Workshop “Toward the Fundamental Principles of the Mathematical Creativity: A Cognitive Perspective” (Original Title: Hacia los Principios Fundamentales de la Creatividad Matemática: Un Enfoque Cognitivo). National University of Colombia in Medellín. December 12 of 2014.
- “Toward a Meta-mathematization of Mathematical Creation”. Speaker and co-organizer (with Jun. Prof. Markus Spitzweck) of the 1-day workshop “Toward the Main Formal Principles of Mathematical Creativity”, University of Osnabrück, October 11 of 2014.
- “A Normality Criterion for Forcing Algebras over the Ring of Polynomials”. Graduierte Kollege Kombinatorische Strukturen in Algebra und Topologie. University Osnabrück, December 18 of 2012.
- “On the Connectedness of Forcing Schemes”. Algebra and Geometry Seminar. Universität Basel. June 1 of 2012.
- “Connectedness of Forcing Schemes: A Criterion over DIP-s and about their Local Nature” (Original Title: Conexidad de Esquemas de Forzado: Un Criterio sobre Dip-s y sobre su Naturaleza Local). Research School CIMPA-UNESCO MESR. MICINN-COLOMBIA Algebraic Structures, their Representations and applications in geometry and non-associative models. Cartagena, March 11-16 of 2012.
- “Basic Properties of Forcing Algebras”. Graduierte Kollege Kombinatorische Strukturen in Algebra und Topologie. University Osnabrück, October 18 of 2011.
- “A Normality Criterion for Forcing Algebras over the Ring of Polynomials over a Perfect Field” (Original Title: Un Criterio de Normalidad para Algebras de Forzado sobre el Anillo de Polinomios en un Campo Perfecto). Mathematical Colloquium of the School of Mathematics of the National University of Colombia in Medellín, March 4 of 2011.
- “Hilbert’s Tenth Problem and Some Related Problems” (Original Title: El Décimo Problema de Hilbert y Algunos Problemas Relacionados). ALTENCOA 02, Meeting of Algebra,

Number Theory, Combinatorics and Applications, University of Cauca and Altenua Group, Popayan, Julio 14 of 2006. ²

(CO-)ORGANIZATION OF INTERNATIONAL CONFERENCES, COLLOQUIA AND WORKSHOPS

- “Foundations of Human and Artificial Intelligence: Introduction to Machine Learning”. Intensive Bootcamp. Co-organized by the Universidad Católica del Norte, Cedalc and ARMAINTE, Santa Rosa de Osos, Antioquia, Colombia. December 9-13 of 2019.
- Main-Organizer and Moderator of the Event ‘Artificial Intelligence and the Future of Business’, Vienna International Business Club, Expat Vienna Business Agency, February 12, 2019.
- Co-Organizer (together with Prof. Kai-Uwe Kühnberger et al.) of the Zif Workshop From Computational Creativity To Creativity Science. ZIF Center for Interdisciplinary Research (Bielefeld) in Cooperation with the University of Osnabrück, Germany. September 22, 2016.
- Main Organizer of the 1-day Workshop ”Toward the Fundamental Principles of the Mathematical Creativity: A Cognitive Perspective” (Original Title: Hacia los Principios Fundamentales de la Creatividad Matemática: Un Enfoque Cognitivo). National University of Colombia in Medellín. December 12 of 2014.
- Main-organizer (with Prof. Markus Spitzweck) of the 1-day workshop ”Toward the Main Formal Principles of Mathematical Creativity”, University of Osnabrück, October 11 of 2014.

RECORD OF TEACHING ACTIVITIES

In most of the cases duties included some of the following works: writing and grading homework and exams, lecturing and giving tutorials (for more details please see the Research Statement).

- Head Teacher with Alex Narvaes. “Foundations of Human and Artificial Intelligence: Introduction to Machine Learning”. Intensive (one week) Bootcamp (53 hours) . Co-organized by the Universidad Católica del Norte, Cedalc and ARMAINTE, Santa Rosa de Osos, Antioquia, Colombia. December 9-13 of 2019.
- Head teacher. *Seminar in Logic and Cognitive Science*, Vienna University of Technology, winter semester 2017/18.
- Head teacher. *Creating Old and New Mathematical Concepts through a logic-categoric- al Formalization of Formal Conceptual Blending*, University of Osnabrück, summer semester 2016.
- Head teacher. *Hypercomputation, Consciousness, Turing Machines, Qualia and Possible Worlds: On the Scope and Limitations of Human and Artificial Intelligence*, University of Osnabrück, winter semester 2015/16.
- Tutor. *Linear Algebra II*, University of Osnabrück, summer semester 2013.
- Tutor. *Linear Algebra*, University of Osnabrück, winter semester 2012/13.
- Tutor. *Mathematik für Anwender I*, University of Osnabrück, winter semester 2011/12.
- Tutor. *Galois und Körper Theorie*, University of Osnabrück, summer semester 2011.
- Tutor. *Mathematik 3*, University of Osnabrück, winter semester 2010/11.
- Head teacher. *Basic Mathematics and Pre-calculus* , National University of Colombia, semesters 01 and 02 of 2009 and semester 01 of 2010.
- Head teacher of the Seminars of Preparation of Olympic Mathematical Team of the National University of Colombia at the 1-th CIIM (Iberoamerican Inter-universities Mathematical Olympiad).
- Head teacher. *Numerical Systems*, National University of Colombia, Semester 01 of 2009.

²Moreover, I have participated in more than 15 additional conferences, congresses and workshops as attendee.

- Head teacher. *Abstract Algebra 3*, National University of Colombia, Semester 02 of 2008.
- Tutor. *Abstract Algebra 1*, University of Heidelberg, winter semester 2007/08.
- Head teacher. *Calculus 1*, National University of Colombia, semesters 01 and 02 of 2005 and 2006.
- Head teacher. *Differential Equations*, National University of Colombia, September-December of 2004.

SCIENTIFIC REFEREE, REVIEWER AND MEMBERSHIPS

- Journal: *Lecturas Matemáticas*. Colombian Society of Mathematics and University of Los Andes.
- Book: *Catalan's Conjecture*. René Schoof. Universitext, Springer, 2008.

FORMER AND CURRENT KEY INTERNATIONAL COOPERATION PARTNERS

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- Prof. Dr. Kai-Uwe Kühnberger, Institute of Cognitive Sciences, University of Osnabrück, Germany.
- Prof. Dr. Juan Diego Velez. School of Mathematics, National University of Colombia at Medellín.
- Priv. Doz. Dr. Christoph Benzmler, University of Luxembourg and Free University Berlin.
- Prof. Dr. Bruno Buchberger, University Johannes Kepler at Linz.
- Prof. Dr. Razvan Diaconescu, Head of the IMAR (Simion Stoilow Institute of Mathematics of the Romanian Academy) Department of Mathematics and Computational Methods.
- Prof. Dr. Holger Brenner. Institute of Mathematics of the University of Osnabrück.
- Dr. Alan Smaill. School of Informatics of the University of Edinburgh.
- Prof. Dr. Alison Pease. Centre for Argument Technology in the School of Computation of the University of Dundee,
- Prof. Dr. Ahmed M. H. Adbel-Fattah. Faculty of Science at Ain Shams University, Egypt.
- Prof. Dr. Maricarmen Martinez Balares. Department of Mathematics of Los Andes University, Bogotá, Colombia.
- Prof. Dr. Peter König, Institute of Cognitive Science, University of Osnabrück.
- Prof. Dr. Jutta Müller, Institute of Cognitive Science, University of Osnabrück.
- Dr. Mihai Codescu. KRBD Research Center of the Free University of Bozen-Bolzano.
- Dr. Marco Schorlemmer. Institute of Artificial Intelligence Research (IIIA-CSIC) in Barcelona.
- Dr. Ulf Krumnack. Institute of Cognitive Sciences of the University of Osnabrück.
- Dr. Felix Bou. University of Valencia, Spain.
- Dr. Ewen Maclean. School of Informatics of the University of Edinburgh.
- Dr. Joe Corneli. Computational Creativity Research Group at Goldsmiths College (University of London).
- Prof. Dr. Ismael Rivera. Faculty of Engineering of the University Pascual Bravo, Medellín.
- Prof. Dr. Marlon Fulla, Faculty of Engineering of the University Pascual Bravo, Medellín.
- Institute of Discrete Mathematics and Geometry, Vienna University of Technology, Austria.
- Institute of Cognitive Sciences, University of Osnabrück, Germany.
- Informatics Forum of the University of Edinburgh.
- Research Group "Algebra and Discrete Mathematics" at the Institute of Mathematics of the University of Osnabrück.
- Research Group "Arithmetic Geometry" at the Institute of Mathematics of the University of Heidelberg.

- Research Group in Commutative Algebra and Algebraic Geometry of the School of Mathematics of the National University of Colombia at Medellín.

ADDITIONAL MEMBERSHIPS AND REMARKS

- Vice-President of the Vienna International Business Club (Vienna's Premier English-Speaking Business Club). www.ViennaBusiness.at
- Former Member of the Network of Entrepreneurs Impact Hub Vienna.
- Former Member of the Association of Symbolic Logic.

LANGUAGE SKILLS

- Spanish (native speaker).
- English (fluid speaker).
- German (fluid speaker).