

Omar León Sánchez

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Academic Positions

Turing Research Fellow. University of Manchester, School of Mathematics. October 2016–

Postdoctoral Fellow. McMaster University. Department of Mathematics and Statistics. September 2013–August 2016.

Academic Degrees

PhD in Pure Mathematics. University of Waterloo, 2013. Thesis: “Contributions to the model theory of partial differential fields”. Advisor: Rahim Moosa.

Master’s Degree in Mathematics. Benemérita Universidad Autónoma de Puebla, 2008. Thesis: “A new Clifford-Fourier transform and Paley-Wiener type theorems”. Advisors: Arnoldo Bezanilla and Garret Sobczyk.

Bachelor’s Degree in Mathematics and Economics. Universidad de las Américas Puebla, 2006. Thesis: “A modular approach to rational interpolation”. Advisor: Garret Sobczyk.

Research Interests

Algebra and Model Theory. Especially the interactions between them.

Refereed Publications

1. O. León Sánchez. *Estimates for the coefficients of differential dimension polynomials.* To appear in Mathematics of Computation. <https://128.84.21.199/pdf/1703.00509.pdf>
2. S. Launois and O. León Sánchez. *On the Dixmier-Moeglin equivalence for Poisson-Hopf algebras.* To appear in Advances of Mathematics. <https://arxiv.org/pdf/1706.01279.pdf>

3. O. León Sánchez and R. Moosa. *A note on isolated types of finite rank*. To appear in *Selecta Mathematica*. <https://arxiv.org/pdf/1712.00933.pdf>
4. O. León Sánchez. *Algebro-geometric axioms for $\text{DCF}_{0,m}$* . *Fundamenta Mathematicae*, 243:1–8, 2018. <https://tinyurl.com/y79zt76v>
5. R. Gustavson and O. León Sánchez. *Effective bounds for the consistency of differential equations*. *Journal of Symbolic Computation*, 89:41–72, 2018. <https://tinyurl.com/y8ekf3of>
6. J. Bell, O. León Sánchez and R. Moosa. *D-groups and the Dixmier-Moeglin equivalence*. *Algebra and Number Theory*, 12(2):343–378, 2018. <https://tinyurl.com/y8ouzl2s>
7. O. León Sánchez and A. Pillay. *Some definable Galois theory and examples*. *The Bulletin of Symbolic Logic*, 23(2):145–159, 2017. <http://tinyurl.com/y8ewcsyw>
8. J. Bell, S. Launois, O. León Sánchez and R. Moosa. *Poisson algebras via model theory and differential algebraic geometry*. *Journal of the European Mathematical Society*, 19:2019–2049, 2017. <http://tinyurl.com/ybcf455b>
9. O. León Sánchez and R. Moosa. *The model companion of differential fields with free operators*. *The Journal of Symbolic Logic*, 81(2):493–509, 2016. DOI:10.1017/jsl.2015.76
10. R. Gustavson and O. León Sánchez. *A new bound for the existence of differential field extensions*. *Proceedings of the 6th International Conference in Mathematical Aspects of Computer and Information Sciences*. Vol. 9582 of *Lecture Notes in Computer Science*, 358–361, Springer 2016.
11. O. León Sánchez and J. Nagloo. *On parameterized differential Galois extensions*. *Journal of Pure and Applied Algebra*, 220(7):2549–2563, 2016. <http://tinyurl.com/h2kwz2o>
12. O. León Sánchez and A. Ovchinnikov. *On bounds for the effective differential Nullstellensatz*. *Journal of Algebra*, 449:1–21, 2016. <http://tinyurl.com/h769rkt>
13. J. Freitag and O. León Sánchez. *Effective uniform bounding in partial differential fields*. *Advances in Mathematics*, 218:308–336, 2016. <http://tinyurl.com/hbgsqwh>
14. O. León Sánchez. *On the model companion of partial differential fields with an automorphism*. *Israel Journal of Mathematics*, 212(1):419–442, 2016. <http://tinyurl.com/j6sehq5>
15. J. Freitag, O. León Sánchez and W. Simmons. *On linear dependence over complete differential algebraic varieties*. *Communications in Algebra*, 44(6):2645–2669, 2016. <http://tinyurl.com/zhmbxd2>

16. O. León Sánchez. *Relative D-groups and differential Galois theory in several derivations*. Transactions of the Amer. Math. Soc., 367(11):7613–7638, 2015. <http://tinyurl.com/gqoswf6>
17. O. León Sánchez. *Geometric axioms for differentially closed fields with several commuting derivations*. Journal of Algebra, 362:107–116, 2012. <http://tinyurl.com/z39vuea>
18. A. Bezanilla and O. León Sánchez. *The Clifford-Fourier transform \mathcal{F}_0 and monogenic extensions*. Advances in Applied Clifford Algebras, 21(4):757–772, 2010. <http://tinyurl.com/h3zg6e9>
19. O. León Sánchez and G. Sobczyk. *Fundamental Theorem of Calculus*. Advances in Applied Clifford Algebras, 21(1):221–231, 2010. <http://tinyurl.com/ho76zml>

Papers Under Review

O. León Sánchez and M. Tressl. *Differential Weil descent and differentially large fields*. Submitted for publication. <https://arxiv.org/pdf/1807.09317.pdf>

J. Freitag, O. León Sánchez and W. Li. *Effective definability of Kolchin polynomials*. Submitted for publication. <https://arxiv.org/pdf/1806.02060.pdf>

Teaching Experience

Galois Theory (33 students). University of Manchester. Fall 2018.

Galois Theory (27 students). University of Manchester. Winter 2018.

Mini-course on Differential Galois Theory. Presented jointly with Alexey Petukhov. University of Manchester. Summer 2017.

Topics Course: Introduction to ω -stable theories. University of Manchester. Fall 2016.

Calculus II for Integrated Sciences (60 students). McMaster University. Winter 2016.

Calculus I for Integrated Sciences (60 students). McMaster University. Fall 2015.

Linear Algebra for Engineering (300 students). McMaster University. Winter 2015.

Calculus I for the Life Sciences (200 students). McMaster University. Fall 2014.

Calculus I for the Life Sciences (450 students). McMaster University. Winter 2014.

Calculus I for the Life Sciences (150 students). McMaster University. Fall 2013.

Calculus II for Engineering (80 students). University of Waterloo. Winter 2012.

Calculus I for the Sciences (110 students). University of Waterloo. Winter 2011.

Student Research Supervision

PhD Student. Kai Ino *Algebraic differential equations and model theory*. University of Manchester, Winter 2019 – .

MSc Project. Sudharsan Sivaramakrishnadas. *Differentially closed fields*. University of Manchester, Winter 2019.

MMATH Project. Tee-Jay Dack. *On valued fields and model theory*. University of Manchester, Fall 2018.

MSc Project and Dissertation. Xuan Gao. *Differential algebra, the Ritt-Raudenbush and primitive element theorems*. University of Manchester, Fall 2017 and Summer 2018.

Student Examinations

2nd Marker. Fotios Rafail Tsaganos. MSc. Project. University of Manchester. Winter 2019.

2nd Marker. Ziyang Ni. Level 3 MMATH Project. University of Manchester. Winter 2019.

2nd Marker. Shi-Qiu. PhD First and Second year report. University of Manchester, Summer 2017 and 2018.

2nd Marker. Richard Pitts. Level 3 MMATH Project. University of Manchester. Spring 2018.

2nd Marker. Ulla Karhumäki. PhD First year report. University of Manchester, Summer 2017.

Service

Organizer of the University of Manchester Logic Seminar, February 2017–

Member of the Equality, Diversity and Inclusion Committee of the School of Mathematics, University of Manchester.

Internal Judge of the 2017 *Mathematics Research Students Conference*, School of Mathematics, University of Manchester.

Organizer of the McMaster University Logic Seminar, September 2014–June 2016.

Event Organization

Organizer of the *Logic and Universal Algebra Session* of the 2019 Latinamerican Algebra Colloquium in Mexico City, August 2019.

Organizer of the conference *Interactions between representation theory and model theory*. July 2019, School of Mathematics, Statistics and Actuarial Sciences, University of Kent, Canterbury.

Organizer of the conference *Applications of the model theory of fields with operators*. June 2019, School of Mathematics, University of Manchester.

Organizer of the conference *Model-theoretic methods in number theory and differential algebraic equations*. August 2018, School of Mathematics, University of Manchester.

Organizer of the *Differential and Difference Algebra* Special Session of the 2017 Spring Eastern Sectional Meeting of the AMS in Hunters College, NY.

Organizer of the *Model Theory* Scientific Session of the 2014 Canadian Mathematical Society Winter Meeting in Hamilton, ON.

Awards and Grants

Heilbronn Institute for Mathematical Research Sponsorship £4,500(GBP): To partially support the organization of the meeting *Applications of the model theory of fields with operators*, June 2019, University of Manchester.

London Mathematical Society Research in Pairs Grant £700(GBP): To partially support a collaborative research visit of Professor Rahim Moosa in May 2019, School of Mathematics, University of Manchester.

London Mathematical Society Conference Grant £5,200(GBP): To partially support the organization of the meeting *Model-theoretic methods in number theory and differential algebraic equations*, August 2018, University of Manchester.

Martin Murray Prize \$5,000(CAD): For best research paper by a graduate student in the Faculty of Mathematics of the University of Waterloo, 2014.

Invited Colloquium and Workshop Talks

Differentially large fields and a bit on CODFs. Workshop on *Tame expansions of o-minimal structures*, University of Konstanz, October 2018.

An introduction to differential Galois theory. Workshop on *Differential Galois theory and differential algebraic groups*, Fields Institute, Toronto. July 2017.

The algebraic theory of differential equations. Pure Mathematics Colloquium. University of Manchester. March 2017.

An introduction to model theory and some applications. Mathematics Departmental Colloquium CIMAT, Mexico. April 2016.

Order bounds for differential polynomials. Differential Algebra, CUNY. April 2016.

Invited Conference Talks

Isolated types in totally transcendental theories. LYMOTS. University of Manchester. March 2019.

Effective bounds in the realm of differential polynomials. 2018 Differential Algebra and Related Topics IX. University of Leeds.

Nonisolated types in DCF and CCM. Model Theory Special Session of the 2017 CMS Winter Meeting. University of Waterloo.

Representation theory of Poisson algebras via model theory. Model theory and differential Galois theory. Barcelona. June 2017.

Isolated types of finite rank in ω -stable theories and applications. LYMOTS. University of Leeds. March 2017.

A bound for typical differential dimension. 2016 Differential Algebra and Related Topics VII at CUNY, NY.

Differential fields with free operators. 2015 Joint Mathematics Meetings, AMS Special Session on Model Theory and Applications.

Parameterized logarithmic equations and their Galois theory. ACA 2014 meeting in Fordham University, New York. Special Session on Computational Differential and Difference Algebra.

On the Galois theory of logarithmic differential equations. 2013 Differential Algebra and Related Topics V at Polytech'Lille, France.

The model companion of partial differential fields with an automorphism. Model Theory Special Session of the 2013 ASL North American Meeting. University of Waterloo.

Seminar Talks

On differentially large fields. Logic Seminar, Università degli Studi della Campania, Caserta, May 2019.

On differentially large fields. Pure Mathematics Seminar, University of East Anglia, Norwich. March 2019.

On differentially large fields. Geometrie at Theorie des Modeles Seminaire, Paris. December 2018.

The Dixmier-Moeglin equivalence: a differential and a model-theoretic version. Maximals Seminar. University of Edinburgh. April 2018.

Poisson algebra representations via model theory. Models and Sets Seminar. University of Leeds. June 2017.

On the differential Dixmier-Moeglin equivalence. Logic Seminar. University of Oxford. June 2017.

On definability of ranks in differential fields. Logic Seminar. UCLAN. April 2017.

The differential Dixmier-Moeglin equivalence. Model Theory Seminar, University of Konstanz. January 2017.

The Dixmier-Moeglin equivalence for differential Hopf algebras. Algebra Seminar, University of Kent, Canterbury. January 2017.

Galois theory of algebraic differential equations. Algebraic Geometry Seminar, CIMAT. April 2016.

Effective bounds for the consistency of differential equations. Geometry and Model Theory Seminar, Fields Institute. November 2015.

A differential Hensel's lemma for local algebras. Kolchin Seminar in Differential Algebra. The City University of New York. May 2015.

Bezout-type computations for (algebraic) PDE's. Algebra Seminar, University of Kent, Canterbury. April 2015.

Effective bounds of finite solution sets of PDE's. Algebra Seminar, University of Waterloo. September 2014.

Effective bounds for finite differential-algebraic varieties. Kolchin Seminar in Differential Algebra. The City University of New York. September 2014.

Partial differential fields with an automorphism. UC Berkeley Model Theory Seminar. April 2014.

On differential algebraic, but not constrained, families. Kolchin Seminar in Differential Algebra. The City University of New York. April 2014.

Extending differential free operators. Kolchin Seminar in Differential Algebra, The City University of New York, December 2013.

Model companions of differential fields with free operators. Mini Conference on Differential Algebra and Model Theory, University of Notre Dame. November 2013.

A conjecture on isolated types in DCF_0 . Model Theory and Groups Seminar, Université Paris Diderot - Paris 7. October 2013.

Model theory of (partial) differential fields with an automorphism. Logic Seminar, Ohio State University. May 2013.

Differential D -groups and Galois theory. Kolchin Seminar in Differential Algebra, The City University of New York. March 2013.

The model-companion of partial differential fields with an automorphism. Geometry and Model Theory Seminar, Fields Institute. February 2013.

Relative D -groups in partial differential Galois theory. Model Theory Seminar, McMaster University. November 2011.

Partial D -groups in differential Galois theory. Model Theory and Descriptive Set Theory Seminar, University of Illinois at Urbana-Champaign. November 2011.

Relative D -groups in partial differential Galois theory. Logic Seminar, University of Notre Dame. November 2011.

Generalized strongly normal extensions in several derivations. Logic Seminar, University of Illinois at Chicago. November 2011.

Invited Participation at Institute Workshops

Model theory combinatorics and valued fields. CIRM. Luminy, France. January 2018.

Neostability theory. BIRS-CMO. Oaxaca, Mexico. July 2015.

Model theory difference/differential equations and applications. CIRM. Luminy, France. April 2015.