MOHAMED BARAKAT
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Personal:	
Birthday:	21 December 1973
Place of birth:	Cairo, Egypt
Nationality:	German (since February 2013)
Marital status:	married, two sons and one daughter

School education:	
1979 – 1983	Orouba language School in Cairo
1983 – 1992	Deutsche Evangelische Oberschule in Cairo
May 1992	German Abitur

Higher education:	
1992 – 1997	Study of mathematics with minor physics at the RWTH Aachen University
1995	Vordiplom in mathematics with the total degree *"very good"*
October 1997	Diploma in mathematics at the RWTH Aachen University with the total degree *"excellent"*
January 2002	Ph.D. in mathematics at the RWTH Aachen University *"summa cum laude"*
March 2010	Habilitation in mathematics at the RWTH Aachen University

Academia:	
1993 – 1994	Teaching assistant at the Institut für Statistik und Wirtschaftsmathematik
2000 – 2002	Research assistant at the Lehrstuhl B für Mathematik, RWTH Aachen University
2002 – 2008	Scientific assistant at the Lehrstuhl B für Mathematik, RWTH Aachen University
2008 – 2009	Research assistant at the Universitity of the Saarland
since October 2009	Lecturer at the University of Kaiserslautern
summer semester 2014	Deputy professor of Algebra at the Catholic University Eichstätt-Ingolstadt
summer & winter semester 2015	Deputy professor of Algebra at the RWTH Aachen University
since February 2016	Full professor of pure mathematics at the University of Siegen

Grants & prizes:	
Nov. 1997 – Nov. 2000	Ph.D. grant from the graduate school "Analyse und Konstruktion in der Mathematik"
October 2002	Borchers-Medal of the RWTH Aachen University
October 2002	Friedrich-Wilhelm Prize of the RWTH Aachen University

Research visits:	
Winter 2002/03 (4 month)	Guest of the mathematical institute of the Utrecht University
November 2007 (1 week)	Guest at INRIA – Sophia Antipolis, Nice as member of the Procope program *Computational Methods in Mathematical Systems Theory*
May 2008 (1 week)	Guest at the Departamento de Álgebra of the Universidad de Sevilla
March 2012 (2 weeks)	Guest at the Departamento de Álgebra of the Universidad de Sevilla
June 2012 (1 week)	Guest at INRIA – Saclay, Paris as member of the Procope program *Constructive Algebra for Systems Theory*
December 2012 (1 week)	Guest at INRIA – Saclay, Paris as member of the Procope program *Constructive Algebra for Systems Theory*
February 2015 (1 week)	Guest at the Departamento de Álgebra of the Universidad de Sevilla

Further research activities:	
Since December 2013 2 years	Foreign member of the Proyecto de Investigación de excelencia, Junta de Andalucía – Singularidades, geometría algebraica aritmética y teoría de representaciones: estructuras y métodos diferenciales, cohomológicos, combinatorios y computacionales.

Acquired research funding:

July 2013 3 years	PhD position (126225 €) + 9000 € travel fund for a winning proposal in the DFG priority program "Algorithmic and Experimental Methods in Algebra, Geometry, and Number Theory", Project: *Constructive derived equivalences and equivariant vector bundles*
January 2017 2 years	Postdoc position (133200 €) + 4000 € travel fund for a winning proposal in the DFG Collaborative Research Centre TRR 195 "Symbolic Tools in Mathematics and their Application", Project: *Central software project: Interaction, high-performance and support*
January 2017 4 years	Postdoc position (266400 €) + 16000 € travel fund + 31816 € Research assistant for a winning proposal in the DFG Collaborative Research Centre TRR 195 "Symbolic Tools in Mathematics and their Application", Project: *Derived categories of equivariant coherent sheaves*

Refereed publications
(inverse chronological)

[1] Mohamed Barakat and Markus Lange-Hegermann, *A constructive approach to the module of twisted global sections on relative projective spaces*, To appear in Algorithmic and Experimental Methods in Algebra, Geometry, and Number Theory, (Springer), (`arXiv:1409.6100`).

[2] Takuro Abe, Mohamed Barakat, Michael Cuntz, Torsten Hoge, and Hiroaki Terao, *The freeness of ideal subarrangements of Weyl arrangements*, J. Eur. Math. Soc. **18** (2016), no. 6, 1339–1348, (`arXiv:1304.8033`).

[3] Mohamed Barakat, *On subdirect factors of a projective module and applications to system theory*, Multidim. Syst. Sign. Process. **26** (2015), 339–348, (`arXiv:1305.0058`).

[4] Mohamed Barakat and Markus Lange-Hegermann, *On the Ext-computability of* SERRE *quotient categories*, Journal of Algebra **420** (2014), 333–349, (`arXiv:1212.4068`).

[5] Mohamed Barakat and Markus Lange-Hegermann, *Characterizing Serre quotients with no section functor and applications to coherent sheaves*, Appl. Categor. Struct. **22** (2014), no. 3, 457–466, (`arXiv:1210.1425`).

[6] Mohamed Barakat and Markus Lange-Hegermann, *On monads of exact reflective localizations of Abelian categories*, Homology, Homotopy and Application **15**, (2013), no. 2, 145–151, (`arXiv:1202.3337`).

[7] Mohamed Barakat and Michael Cuntz, *Coxeter and crystallographic arrangements are inductively free*, Advances in Mathematics **229** (2012), no. 1, 691–709, (`arXiv:1011.4228`).

[8] Mohamed Barakat and Markus Lange-Hegermann, *An axiomatic setup for algorithmic homological algebra and an alternative approach to localization*, J. Algebra Appl. **10** (2011), no. 2, 269–293, (`arXiv:1003.1943`).

[9] Mohamed Barakat and Simon Görtzen, *Simplicial cohomology of smooth orbifolds in* GAP, Proceedings of the third International Congress on Mathematical Software - ICMS 2010 (Kobe, Japan) (K. Fukuda et al., ed.), Lecture Notes in Computer Science, vol. 6327, Springer, 13–17 September 2010, pp. 46–49, (`http://www.mathb.rwth-aachen.de/~barakat/ICMS10/SCO.pdf`).

[10] Mohamed Barakat and Stanislaus Maier-Paape, *Conley index theory*, Proceedings of the 19th International Symposium on Mathematical Theory of Networks and Systems - MTNS 2010 (Budapest, Hungary) (András Edelmayer, ed.), 5–9 July 2010, pp. 1645–1651 (`http://www.conferences.hu/mtns2010/proceedings/Papers/286_472.pdf`).

[11] Mohamed Barakat, *Purity filtration and the fine structure of autonomy*, Proceedings of the 19th International Symposium on Mathematical Theory of Networks and Systems -

MTNS 2010 (Budapest, Hungary) (András Edelmayer, ed.), 5–9 July 2010, pp. 1657–1661 (`http://www.conferences.hu/mtns2010/proceedings/Papers/288_451.pdf`).

[12] Mohamed Barakat and Stanislaus Maier-Paape, *Computation of connection matrices using the software package* `conley`, Internat. J. Bifur. Chaos Appl. Sci. Engrg. **19** (2009), no. 9, 3033–3056.

[13] Mohamed Barakat and Daniel Robertz, `conley`*: Computing connection matrices in* Maple, J. Symbolic Comput. **44** (2009), no. 5, 540–557, (`arXiv:math.DS/0701173`).

[14] Mohamed Barakat and Daniel Robertz, `homalg` − *A meta-package for homological algebra*, J. Algebra Appl. **7** (2008), no. 3, 299–317, (`arXiv:math.AC/0701146`).

[15] Mohamed Barakat and Daniel Robertz, *Computing invariants of multidimensional linear systems on an abstract homological level*, Proceedings of the 17th International Symposium on Mathematical Theory of Networks and Systems - MTNS 2006 (Kyoto, Japan), 2006, pp. 542–559, (`http://www.mathb.rwth-aachen.de/~barakat/mtns/homalg_mtns06.pdf`).

[16] Mohamed Barakat and Daniel Robertz, `homalg`*: First steps to an abstract package for homological algebra*, Proceedings of the X meeting on computational algebra and its applications - EACA 2006 (Sevilla, Spain), 2006, pp. 29–32, (`http://www.mathb.rwth-aachen.de/~barakat/eaca/homalg_eaca06.pdf`).

[17] Mohamed Barakat, *The existence of Cartan connections and geometrizable principal bundles*, Arch. Math. (Basel) **83** (2004), no. 2, 159–163, (`arXiv:math.DG/0206136`).

[18] Mohamed Barakat, `jets`*. A MAPLE-package for formal differential geometry*, Computer algebra in scientific computing (Konstanz, 2001), Springer, Berlin, 2001, pp. 1–12, (`http://www.mathb.rwth-aachen.de/~barakat/casc/casc.pdf`).

[19] Mohamed Barakat and Martin Oberlack, *Reduction and long time behaviour of homogeneous turbulence under spatially constant mean-velocity gradient*, Advances in turbulence VIII: Proc. of the Eights European Turbulence Conference (Barcelona, Spain) (C. Dopazo, ed.), CIMNE, June 27-30 2000, pp. 865–868.

Preprints
(inverse chronological)

[20] Mohamed Barakat and Markus Lange-Hegermann and Sebastian Posur, *Elimination via homogenization*, (`arXiv:1707.00925`).

[21] Mohamed Barakat and Markus Lange-Hegermann, *Gabriel morphisms and the computability of Serre quotients with applications to coherent sheaves*, (`arXiv:1409.2028`).

[22] Mohamed Barakat, *Spectral filtrations via generalized morphisms*, (`arXiv:0904.0240`).

[23] Mohamed Barakat and Barbara Bremer, *Higher extension modules and the Yoneda product*, (`arXiv:0802.3179`).

Non-refereed publications
(inverse chronological)

[24] Mohamed Barakat, Max Horn, Frank Lübeck, Oleksandr Motsak, Max Neunhöffer, Hans Schönemann, *The GAP package* `SingularInterface`, Computeralgebra-Rundbrief, **55**, 29–33, October 2014, (`http://www.fachgruppe-computeralgebra.de/data/CA-Rundbrief/car55.pdf`).

[25] Mohamed Barakat, *Computations of unitary groups in characteristic* 2, (for J.-P. Serre), 2013, (`http://www.mathematik.uni-kl.de/~barakat/forJPSerre/UnitaryGroup.pdf`).

[26] Mohamed Barakat and Markus Lange-Hegermann, *Computing Ext in Serre quotient categories*, Mini-Workshop: Constructive Homological Algebra with Applications to Coherent Sheaves and Control Theory, no. 25, MFO, Oberwolfach, 2013, pp. 14–17.

[27] Mohamed Barakat and Markus Lange-Hegermann, *The* `homalg` *project*, Computeralgebra-Rundbrief, **51**, 6–9, October 2012, (`http://www.fachgruppe-computeralgebra.de/data/CA-Rundbrief/car51.pdf`).

[28] Mohamed Barakat, *Jet groupoids and the invariance of geometric structures*, Mini-Workshop: Algebraic and Analytic Techniques for Polynomial Vector Fields, no. 57, MFO, Oberwolfach, 2010, pp. 19–21.

[29] Mohamed Barakat, *Spectral sequences and effective computations*, Mini-Workshop: Formal Methods in Commutative Algebra: A View Toward Constructive Homological Algebra, no. 50, MFO, Oberwolfach, 2009, pp. 7–12.

Theses

[30] Mohamed Barakat, *Pro-Nilpotente Lie-Algebren*, Diploma thesis, Lehrstuhl B für Mathematik, RWTH Aachen University, October 1997.

[31] Mohamed Barakat, *Functional spaces. A direct approach*, PhD thesis, RWTH Aachen University, January 2002.

[32] Mohamed Barakat, *The homomorphism theorem and effective computations*, Habilitation thesis, RWTH Aachen University, April 2009.

Software projects

[33] *The* `homalg` *project.* 2003–current. (`http://homalg-project.github.io`).

[34] `conley` *package.* 2006–2008. (`http://www.mathb.rwth-aachen.de/conley/`).

[35] `jets` *package.* 2000–2007. (`http://www.mathb.rwth-aachen.de/~barakat/jets/`).

Editorial activity

[36] Associate Editor, *The Journal of Software for Algebra and Geometry*.

Organized (since 2010)

[37] Plesken*'s 60th birthday colloquium*. RWTH Aachen University, 7 May, 2010. (co-organizer)

[38] *The second* Singular-GAP *developers meeting*. University of Kaiserslautern, 14–18 November 2011. (organizer)

[39] *The third* Singular-polymake-GAP *developers meeting*. University of St Andrews, 27–31 August 2012. (organizer)

[40] *The fourth* Singular-GAP *developers meeting*. RWTH Aachen University, 7–11 January 2013. (organizer)

[41] Oberwolfach Mini-Workshop: *Constructive Homological Algebra with Applications to Coherent Sheaves and Control Theory*. Mathematisches Forschungsinstitut Oberwolfach, 12–18 May 2013. (co-organizer)

[42] *The fifth* Singular-GAP *developers meeting*. RWTH Aachen University, 6–10 January 2014. (co-organizer)

[43] *First* GAP *Days*. RWTH Aachen University, 25–29 August 2014. (co-organizer)

[44] *Seventh de Brún Workshop on Homological Perturbation Theory*. National University of Ireland, Galway, 1–5 December 2014. (co-organizer)

[45] *Second* GAP *Days*. RWTH Aachen University, 16–20 March 2015. (co-organizer)

[46] *Third* GAP *Days*. NTNU Trondheim, 14–23 September 2015. (co-organizer)

[47] *Minisymposium der DMV Jahrestagung: Computer Algebra and Applications*. Hamburg, 21–25 September 2015. (co-organizer)

[48] *Session on computational aspects of homological algebra, group, and representation theory at ICMS 2016*. ZIB Berlin, 11–14 July 2016. (co-organizer)

[49] GAP *Days Fall 2017*. University of Siegen, Workshop: 30 August – 1 September, Code sprint: 4–8 September, 2017. (co-organizer)

Advised PhD theses

[50] Sebastian Posur: *Constructive category theory and applications to equivariant sheaves*, PhD thesis, University of Siegen (**submitted February 2017**).

[51] Sebastian Gutsche: *Constructive category theory with applications to algebraic geometry*, PhD thesis, University of Siegen (**submitted April 2017**).

[52] MARTIN BIES: *Cohomologies of coherent sheaves and massless spectra in F-theory*, PhD thesis, Institut für theoretische Physik, University of Heidelberg (coadvisor, **in preparation**).

[53] KAMAL SALEH: *Constructive Quillen model structures*, PhD thesis, University of Siegen (**in preparation**).

Advised graduation theses

[54] FLORIAN DIEBOLD: *Greatest common divisors using homological algebra*, Bachelor thesis, August 2011, University of Kaiserslautern.

[55] HENNING KOPP: *Cube-attack-like cryptanalysis and higher order differential attacks*, Bachelor thesis, September 2011, University of Kaiserslautern.

[56] NINA BINDEL: *Presentation of two fully homomorphic schemes by Gentry*, Bachelor thesis, October 2011, University of Kaiserslautern.

[57] SEBASTIAN GUTSCHE: *An algorithmic framework for toric geometry*, Master thesis, March 2012, RWTH Aachen University.

[58] SEBASTIAN POSUR: *G-equivariant coherent sheaf cohomology*, Master thesis, March 2013, RWTH Aachen University.

[59] EVA MARIA HEMMERLING: *Efficient primary decomposition of zero dimensional ideals*, Bachelor thesis, March 2014, University of Kaiserslautern.

[60] KAMAL SALEH: *Constructions in Boij-Söderberg theory*, Master thesis, March 2015, RWTH Aachen University.

[61] MARCEL HARK: *Minimal free resolutions and the perturbation lemma*, Master thesis, September 2016, RWTH Aachen University.