

CURRICULUM VITAE

SILVIA SABATINI

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Personal: Italian citizen. Born on December 29th 1979 in Velletri (Italy).

Employment:

From October 2014: W2 Professor (tenure) in the Department of Mathematics at the University of Cologne.

September 2013 - August 2014: Post-doctoral researcher at the Centro de Análise Matemática, Geometria e Sistemas Dinâmicos, Instituto Superior Técnico (Lisbon), with a grant from the Fundação para a Ciência e a Tecnologia.

September 2009 - August 2013 : Assistant Professor (collaboratrice scientifique) in the Department of Mathematics (Chair of Geometric Analysis) at the École Polytechnique Fédérale de Lausanne.

Education:

Massachusetts Institute of Technology
Ph.D. in Pure Mathematics, June 2009
Advisor: Prof. Victor Guillemin.

University of Rome “La Sapienza”
B.S. in Mathematics (cum laude), January 2004
Advisor: Prof. Paolo Piazza.

Research Interests:

Equivariant symplectic geometry and its connections with algebraic topology, dynamical systems and combinatorics.

Research Grants:

Member of the following grants:

- “*Symplectic structures in Geometry, Algebra and Dynamics*”, Collaborative Research Centre TRR 191, January 2017 – December 2020.
- “*Geometry, Topology and Mathematical Physics*” (FCT:EXCL/MAT-GEO/0222/2012) 326,000 Euros, May 2013 – April 2016.
- “*Hamiltonian actions and Integrability in Geometry and Topology*” (FCT:POCTI/MATH/117762/2010), 110,000 Euros, March 2012 – February 2015.
- “*Symplectic and Related Geometries*” (FCT:PTDC/MAT/098936/2008), 2010 – 2012.

Publications (in reverse chronological order):

1. **On the Chern numbers and the Hilbert polynomial of an almost complex manifold with a circle action.** To appear in *Communications in Contemporary Mathematics*. [arXiv:1411.6458](https://arxiv.org/abs/1411.6458) [math.AT].
2. **Fermat and the number of fixed points of periodic flows**¹ (with L. Godinho and Á. Pelayo), *Communications in Number Theory and Physics*, **9** (4), 643 – 687 (2015).
3. **From compact semi-toric systems to Hamiltonian S^1 -spaces** (with S. Hohloch and D. Sepe), *Discrete and Continuous Dynamical Systems - A*, **35** (1), 247 – 281 (2015).
4. **Polynomial Assignments** (with V. Guillemin and C. Zara), *Indagationes Mathematicae*, **25** (5), 992 – 1018 (2014).
5. **New tools for classifying Hamiltonian circle actions with isolated fixed points** (with L. Godinho), *Foundations of Computational Mathematics*, **14** (4), 791 – 860 (2014). The accompanying software can be found [here](#).
6. **Balanced fiber bundles and GKM theory** (with V. Guillemin and C. Zara), *International Math. Res. Notices*. **17**, 3886 – 3910 (2013).
7. **Moduli spaces of toric manifolds** (with Á. Pelayo, A.R. Pires and T.S. Ratiu), *Geometriae Dedicata*. **169** (1), 323–341 (2014).

¹This article continues the work of *An integer optimization problem for non-Hamiltonian periodic flows*, [arXiv:1307.6766](https://arxiv.org/abs/1307.6766), (by Á. Pelayo and myself). In particular the article employs classical results in number theory to fully solve the optimization problem presented in [arXiv:1307.6766](https://arxiv.org/abs/1307.6766)

8. **New Techniques for obtaining Schubert-type formulas for Hamiltonian manifolds** (with S. Tolman), *J. Symplectic Geometry* **11** (2), 179 – 230 (2013).
9. **Equivariant K -theory of GKM bundles** (with V. Guillemin and C. Zara), *Annals of Global Analysis and Geometry* **43** (1), 31 – 45 (2013).
10. **Cohomology of GKM fiber bundles** (with V. Guillemin and C. Zara), *J. Algebraic Combinatorics* **35** (1), 19 – 59 (2012).
11. **Towards classifying Hamiltonian torus actions with isolated fixed points** (with L. Godinho). *Proceedings of the Sociedade Portuguesa de Matemática*, May 2013.

Preprints (in reverse chronological order):

1. **12, 24 and beyond** (with L. Godinho and F. von Heymann). Submitted. [arXiv:1604.00277](https://arxiv.org/abs/1604.00277) [math.CO].
2. **Canonical bases for the equivariant cohomology and K -theory rings of symplectic toric manifolds** (with M. Pabiniak). Submitted. [arXiv:1503.04730](https://arxiv.org/abs/1503.04730) [math.SG].

In preparation:

1. **From Hamiltonian S^1 -spaces to compact semi-toric systems** (with S. Hohloch, M. Symington and D. Sepe).
2. **Surgeries of vertical almost-toric systems** (with S. Hohloch, M. Symington and D. Sepe).
3. **A note on the number of focus-focus points on a compact semi-toric system.**

Thesis: “The topology of GKM spaces and GKM fibrations”, Ph.D. Thesis, MIT, June 2009.

Conferences and Workshops (in reverse chronological order):

Invited speaker at the following conferences and workshops:

- “7th European Congress of Mathematics”, Section *Topology* (Berlin, July 2016)
Title of the talk: *Circle actions in symplectic geometry* (Joint talk with Leonor Godinho, IST Lisbon).
- “Poisson 2016” (Zurich, July 2016)
Title of the talk: *On the geography of symplectic manifolds with group actions and applications*
- “Integrable Systems” (CSF Ascona, Switzerland, June 2016)
- “Topology and Geometry of Lie group actions” (DMV meeting, Hamburg, September 2015).
Title of the talk: *Group actions in symplectic geometry.*
- “Symplectic Techniques in Topology and Dynamics ” (University of Cologne, September 2014).
Title of the talk: *Hamiltonian actions of tori and semi-toric systems of 4-dimensional compact symplectic manifolds.*

- “*GQT Colloquium*” (Woudschouten conference center, Netherlands, July 2014).
Title of the talk: *When does a manifold have symmetry?*
- “*Higher Geometric Structures along the Lower Rhine V*” (Radboud University, Nijmegen, June 2014).
Title of the talk: *Using number theory for counting the number of fixed points of periodic flows.*
- “*Beyond toric integrability*” (Conference at Centre Bernoulli, EPFL, December 2013).
Title of the talk: *Semi-toric systems on compact symplectic manifolds.*
- “*Integrable systems and semiclassical analysis*” (Workshop at Centre Bernoulli, EPFL, July 2013).
Title of the talk: *Equivariant topological invariants of Hamiltonian manifolds.*
- “*Young Researchers Meeting*”, Keynote speaker of Geometry (Conference at U. of Edinburgh, June 2013).
Title of the talk: *Classifying Hamiltonian actions on symplectic manifolds.*
The video of the talk is available [here](#).
- “*Encontro Nacional da Sociedade Portuguesa de Matemática 2012*” (Conference at U. of Algarve, July 2012)
Title of the talk: *New tools for classifying Hamiltonian circle actions with isolated fixed points.*
- “*Moment maps*” (Workshop at Centre Bernoulli, EPFL, August 2008)
Title of the talk: *A geometric approach to Schubert calculus.*
- *AMS sectional meetings*, (Conference at Rutgers U. New Brunswick, NJ, October 2007)
Fall Eastern Section Meeting. Special section on:
“*Invariants of Lie Group Actions and Their Quotients*”
Title of the talk: *On the S^1 -equivariant cohomology of a compact symplectic manifold.*

Invited to participate at the following workshops:

- “*Localization techniques in equivariant cohomology*”
(American Institute of Mathematics in Palo Alto, California, March 2010)
- Women and Mathematics Program: “*Algebraic Geometry and Group Actions*”
(IAS, May 14 to May 25 2007)

Selected to participate at the following program:

- IAS/PCMI Summer Program: “*Low Dimensional Topology*”
(Park City UT, June 25 to July 15 2006).

Besides the conferences I was invited to, I participated at the following conferences:

- *VIII Workshop on Symplectic Geometry, Contact Geometry, and Interactions* (Lisbon, January 2014).
- *Conference in honor of Alan Weinstein* (Centre Bernoulli, EPFL, July 2013).
- *Integrable Systems and Semiclassical Analysis* (Centre Bernoulli, EPFL, July 2013).

- *D-Days: A Panorama of Geometry. Conference in honor of Dietmar Salamon for his 60th birthday* (ETH Zurich, June 2013).
- *Poisson 2012: Poisson Geometry in Mathematics and Physics* (Utrecht U., August 2012).
- *GESTA 2011: New Trends in Symplectic and Contact Geometry* (CIEM, Castro Urdiales, June 2011).
- *Geometry, Mechanics, and Dynamics: A Workshop celebrating the 60th Birthday of Tudor Ratiu* (CIRM, July 2010).
- *Colloque Paulette Libermann* (Institut Henri Poincaré, December 2009).
- *Higher Structures in Mathematics and Physics* (EPFL, November 2008).
- *Geometric Aspects of Analysis and Mechanics: A Conference in Honor of the 65th Birthday of Hans Duistermaat*, (Utrecht U., August 2007).

Seminar and Colloquium talks:

Invited speaker at the following seminars, Colloquia and lectures:

- TU Berlin, “*Reinhold-Baer-Kolloquium*”
“*12, 24 and beyond*” (January 2017)
- Université de Genève, “*Colloque de Mathématiques*”
“*A bridge from reflexive polytopes to symplectic geometry*” (November 2016)
- Université de Genève, “*Séminaire “Groupes de Lie et espaces des modules”*”
“*On the Chern numbers of a symplectic manifold with symmetries*” (November 2016)
- Georg-August-Universität Göttingen, “*Kolloquium des Mathematischen Institut*”
“*A bridge from reflexive polytopes to symplectic geometry*” (October 2016)
- Freie Universität Berlin, “*Seminar Algebraische Geometrie*”
“*12, 24 and beyond: from symplectic geometry to combinatorics*” (December 2015)
- University of Münster, “*Symplectic Geometry Seminar*”
“*12 and 24 in symplectic geometry and combinatorics - Proofs*” (November 2015)
- University of Münster, “*Kolloquium der Mathematischen Institute*”
“*12 and 24 in symplectic geometry and combinatorics*” (November 2015)
- Ludwig-Maximilians-Universität München, “*Oberseminar Geometrie*”
“*On the geography of almost complex manifolds with a circle action and classification problems in equivariant symplectic geometry*” (January 2015)
- University of Münster, “*Seminar on symplectic and contact geometry*”
“*On the geography of almost complex manifolds acted on by a circle*” (January 2015)

- Ruhr-Universität Bochum, “Oberseminar Analysis”
“The role of Chern numbers in the classification of the topological invariants of symplectic manifolds with symmetries” (October 2014)
- University of Porto, “Geometry and Topology Seminar”
“Chern numbers of compact symplectic manifolds with a circle action” (March 2014)
- University of Sheffield, “Differential Geometry Seminar”
“Chern numbers of compact symplectic manifolds with a circle action” (February 2014)
- Max Planck Institute for Mathematics, “Higher Differential Geometry Seminar”
“Classification problems in equivariant symplectic geometry” (November 2013)
- Utrecht University, “Geometry and Algebra, Geometry and Analysis”
“Classification problems in equivariant symplectic geometry” (November 2013)
- Université de Genève, “Groupes de Lie et espaces des modules”:
“Computing the equivariant cohomology ring of flag varieties using their symplectic structure” (December 2013)
“New tools for classifying S^1 -Hamiltonian actions with isolated fixed points” (May 2012)
- Massachusetts Institute of Technology, *D. W. Weeks Lecture Series*
“The geography of (some) manifolds with symmetries” (March 2013)
- Università di Roma “La Sapienza”, “Algebra and Geometry seminar”:
“Nuovi metodi per classificare azioni Hamiltoniane di S^1 ” (January 2013)
- ETH Zürich, “Symplectic Geometry Seminar”:
“A necessary condition for S^1 -Hamiltonian actions with isolated fixed points” (October 2011)
- Instituto Superior Técnico, “Geometria em Lisboa”
“A necessary condition for S^1 -Hamiltonian actions with isolated fixed points” (November 2011)
“GKM spaces and GKM fiber bundles” (November 2009)
“Equivariant cohomology of Hamiltonian T -spaces and equivariant fiber bundles” (November 2008)
- University of Illinois at Urbana-Champaign, “Symplectic geometry seminar”
“Canonical classes and T -equivariant cohomology of a Hamiltonian space” (October 2007)
“A simpler path formula for equivariant cohomology” (November 2007)

Other seminars:

- École Polytechnique Fédérale de Lausanne, “Hamiltonian Dynamics seminar”:
“A necessary condition for S^1 -Hamiltonian manifolds” (March 2012)
“A symplectic generalization of the Petrie’s conjecture” (March 2010)
“The equivariant cohomology of a GKM space” (November 2009)
“GKM spaces and GKM fiber bundles” (October 2009)
- Massachusetts Institute of Technology, “Group actions on symplectic manifolds”
“On the T -equivariant cohomology of a Hamiltonian T -manifold” (March 2008)

Organizer and main speaker of the following weekly seminar:

“*Equivariant de Rham theory and Morse theory*”, MIT, Spring 2006, Fall 2005.

Visiting positions:

- I was invited by Prof. Christian Blohmann to visit the Max Planck Institute for Mathematics from 25/11/13 until 29/11/13.
- In January 2012 and March 2013, Prof. Victor Guillemin invited me to visit the Department of Mathematics at the Massachusetts Institute of Technology.
- Since 2009 I have been invited several times by Prof. Leonor Godinho to visit the Department of Mathematics at the Instituto Superior Técnico (Lisbon).
- From September 2007 until December 2007 I visited the University of Illinois at Urbana-Champaign to work with Prof. Susan Tolman.

Fellowships and honors:

Graduate Student Appreciation (GSA) Fellowship, MIT, September 2007–December 2007

The GSA Fellowship is awarded to an outstanding woman student in the Department of Mathematics nearing completion of her degree. It provides financial support (tuition and stipend) for one semester.

Norman Levinson Fellowship, MIT, February 2005–May 2005

The Norman Levinson Fellowship is the top fellowship in Pure Math. Offered to an incoming student, it provides financial support (tuition and stipend) for one semester.

Akamai Presidential Fellowship, MIT, September 2004–December 2004

Selected as a Presidential Fellow in 2004-2005. Recipient of an Akamai Presidential Fellowship in Fall 2004. This fellowship program aims at recruiting the best and brightest to MIT. The fellowship provides financial support (tuition and stipend) for one semester.

Academic service:

- Referee for *Advances in Mathematics*, *Journal of the London Mathematical Society*, *International Math. Res. Notices*, *J. Symplectic Geometry*, *Central European J. of Math.* *Nonlinearity*.
- In December 2012 I served as a jury member in the Ph.D. thesis defense of Maria Joao Quintao (IST, Lisbon. Advisor: Prof. Miguel Abreu).
- In July 2012 I was part of a teaching committee at EPFL.

Teaching experience (in reverse chronological order):

Current teaching duties: Lecturing for the following Bachelor and Master courses:

- *Lineare Algebra I*, Köln, WS 2016/17.
- *Topologie*, Köln, SS 2016.
- *Elementare Differentialgeometrie*, Köln, WS 2015/16.

- *Symplectic Geometry*, Köln, SS 2015.
- *Algebraic Topology*, Köln, WS 2014/15.

For more information about my current teaching duties, click [here](#).

Past teaching duties: Organizer of the graduate courses:

- *Hamiltonian Dynamics I*, EPFL, Fall 2012, Fall 2011.
- *Hamiltonian Dynamics II*, EPFL, Spring 2012.

Teaching Assistant (TA) positions (2005 – 2012):

Head assistant for: *Riemannian Geometry*, EPFL, Fall 2012, 2011.
Analyse IV, EPFL, Spring 2012.
Analyse III, EPFL, Fall 2011.

TA recitation instructor for: *Analyse IV*, EPFL, Spring 2011, 2010.
Analyse III, EPFL, Fall 2012, 2010.
Analyse II, EPFL, Spring 2010.
Analyse I, EPFL, Fall 2009.
Advanced Multivariable Calculus, MIT, January 2009.
Advanced Multivariable Calculus, MIT, January 2008.
Multivariable Calculus, MIT, Spring 2007.

TA grader for: *Analysis on Manifolds*, MIT, Fall 2006.
Geometry of Manifolds, MIT, Spring 2006.
Analysis II, MIT, Fall 2005.

Language ability: Native speaker of Italian, fluent in English, good in French, basic Portuguese, learning German.