

MARCELLO MAMINO

Birth

Asti, 29·X·1980

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CURRICULUM VITÆ

Università di Pisa

30·III·2004

Laurea in mathematics, with best degrees (110/110 cum laude)

Supervisor: prof. A. Berarducci

Title: *Complessità computazionale di un gioco combinatorio su grafi* (on the computational complexity of a combinatorial game)

Scuola Normale Superiore di Pisa

19·I·2005

Diploma di licenza, with best degrees (70/70 cum laude)

Scuola Normale Superiore di Pisa

Since year 2005

PhD student

Universidad Complutense de Madrid

16–22·XI·2008

Collaboration with professor M. Otero

Fields Institute, University of Toronto

23·III·2009–19·IV·2009

Research grant in the *Thematic Program on o-minimal Structures and Real Analytic Geometry*

Dipartimento di Matematica Applicata “Ulisse Dini” di Pisa

1·III·2009–1·III·2010

Research scholarship for the study of groups definable in o-minimal structures

RESEARCH INTERESTS

After a *Laurea* (comparable to MSc) thesis in computational complexity, I have been studying the model theory of totally ordered structures. My first results in the field have been in the classification of the Dedekind cuts on a totally ordered Abelian group (Fornasiero and myself, 2008). Then I devoted myself to the investigation of definably compact groups definable in an o-minimal structure.

In particular, o-minimal structures are totally ordered first order structures in which all sets definable in one variable are definable from the order alone. The study of o-minimal structures, was born in the 1980s from work of A. Pillay, C. Steinhorn, and L. Van den Dries, as a generalization of real semialgebraic and subanalytic geometry. Many properties of semialgebraic sets are shared by sets definable in an o-minimal structure: there is a well-behaved notion of dimension, a cell-decomposition theorem, etc. Chief examples of o-minimal structures are the semialgebraic sets on a real closed field, \mathbb{R} with all the analytic functions of a closed interval and \mathbb{R} with all the Pfaffian functions.

An interesting line of research in the field stemmed from Pillay's proof (in 1988) that any group definable in an o-minimal structure (i.e. the set and the graph of the group operation are definable) admits a unique structure of *definable manifold* that makes it into a topological group; in particular, any group definable in an o-minimal structure whose underlying set is \mathbb{R} is a Lie group. It turns out that, even with no restriction on the underlying structure, there is a canonical way of associating to each definable group G a Lie group, which, under some non-restrictive hypothesis, is the quotient of G by a so called *infinitesimal subgroup* G^{00} (Berarducci, Otero, Peterzil and Pillay, 2005).

When G is a *definably compact* group, assuming that the o-minimal structure expands a real closed field, G/G^{00} (as a manifold) has been shown (Hrushovski, Peterzil and Pillay, 2006) to have the same dimension of G (as a *definable* manifold), and the same cohomology (Berarducci, 2009).

My results include a characterization of the higher (definable) homotopy groups of definably compact groups (in collaboration with A. Berarducci and M. Otero, 2009), a characterization of the definable homotopy type of a definably compact group (with A. Berarducci, 2009), and a splitting theorem which reduces the problem of determining the definable homeomorphism type of a definably compact group to the Abelian case (2010).

I am part of the research project PRIN 2007 *Model Theory, Set Theory and Applications* funded by the Italian Ministry of Education, Universities and Research, Principal Investigator Carlo Toffalori. I am now in the process of completing my PhD in Mathematics at the Scuola Normale Superiore in Pisa.

TEACHING EXPERIENCE

I have been teaching in undergraduate courses of linear algebra and geometry at the *Facoltà di Ingegneria, Università di Pisa*.

PAPERS

Arithmetic of Dedekind cuts on ordered Abelian groups

with A. Fornasiero, *Annals of Pure and Applied Logic* 156 (2008) 210–244,
doi:10.1016/j.apal.2008.05.001
arXiv:math/0612235

Higher homotopy of groups definable in o-minimal structures

with A. Berarducci & M. Otero, to be published in the *Israel Journal of Mathematics*, 10·II·2009, 13 pp.
arXiv:0809.4940

On the homotopy type of definable groups in an o-minimal structure

with A. Berarducci, accepted by the *Journal of the London Mathematical Society*, 26·VII·2010, 25 pp.
arXiv:0905.1069

Splitting definably compact groups in o-minimal structures

accepted by the *Journal of Symbolic Logic*, 22·IX·2010, 13 pp.
arXiv:1001.2229

Abstracts and text in pre-publication version are available through arXiv or the home page <http://linuz.sns.it/~m2/>

Pisa, 21·V·2010