

Newsletter No. 5
of the
European RTN Network RAAG
Contract No. HPRN-CT-2001-00271
November 1, 2002

Through a contract with the Universität Passau in Germany, the European Community has established the Research Training Network RAAG (*Real Algebraic and Analytic Geometry*). This bi-monthly newsletter, to be distributed among the Network researchers and other interested mathematicians by e-mail, will inform about the activities and the progress of the Network and about matters of interest to the Network's researchers. Further information about the Network, and about RAAG in general, may be found on the Network's website at

<http://www.ihp-raag.org/>

The Network RAAG is part of the European IHP programme (Improving the Human Research Potential). General information about this programme and about RTN networks is available at

<http://www.cordis.lu/improving/home.html>

The website

<http://improving.cordis.lu/rtn/>

offers short presentations of the different networks supported by the European Community.

Management of the Network

The College of Coordinators met in Kazimierz Dolny, Poland, during the First Annual General Network Conference RAAG 2002. The items that were discussed included the presentation of the Network through the website and the Newsletter, the employment of young researchers by the Network, the Network's budget, future Network meetings, young researchers, and the first annual report about the progress of the Network (to be submitted to the EC after the first year of the Network, which ends on February 28, 2003). Francesca Acquistapace of the Università di Pisa was appointed as coordinator for all activities concerning young researchers.

In his capacity as Network Coordinator, Niels Schwartz visited the Università di Pisa on October 2 and 3 to discuss the situation of the Italian Network Team, in particular concerning the budget, the employment of young researchers and the upcoming scientific activities in Pisa.

The website

The Network's website is the primary means by which the Network presents itself to the general public. The website has been developed under the responsibility of Frederic Mangolte (Frederic.Mangolte@univ-savoie.fr); his deputy is Didier D'Acunto (ddacu@univ-savoie.fr). Both the content and the design of the website are evolving constantly. Everybody should take a look from time to time. Criticism and suggestions concerning all aspects of the website are invited and are very welcome.

Training and appointments

The training of young researchers is one of the main purposes of the Network. An important part of the training programme is to offer positions and fellowships to young researchers, giving them an opportunity to work with leading real geometers and participate in research of the highest quality.

Current appointments:

- Dr. Hervé Perdry from France does post-doctoral work with Laureano Gonzalez-Vega in Santander, from July 1, 2002, to March 31, 2003.
- Dr. Markus Schweighofer from Konstanz, Germany, works as a post-doc in Rennes, from September 1, 2002, to August 31, 2003.
- M. Dumnicki from Poland works as a pre-doc with Jacek Bochnak in Amsterdam, from September 1, 2002, to August 31, 2003.
- Helene Pennaneac'h from France is a post-doc fellow at the Università di Pisa, where she works with Francesca Acquistapace and Fabrizio Broglia, from September 1, 2002, to August 31, 2003.
- Remi Soufflet from France is a post-doctoral Network fellow at the Uniwersytet Jagiellonski in Kraków, where he works with Wieslaw Pawlucki, from September 15, 2002, to September 14, 2003.
- Igor Klep from Slovenia has as a pre-doc position in Regensburg, from October 1, 2002, to September 30, 2003.
- Didier D'Acunto from Chambéry, France, is a post-doc at the Universidad Complutense in Madrid, October 1, 2002, to May 31, 2003.
- Olivier Ruatta from France is a post-doc fellow at the Università di Pisa to work with Francesca Acquistapace and Fabrizio Broglia, from October 1, 2002, to March 31, 2003.

- Artur Piekosz from Poland works as a post-doc with Alex Wilkie at Oxford University, October 1, 2002, to May 31, 2003.

Expired appointments:

- José F. Fernando from the Universidad Complutense, Madrid, did post-doctoral work with Claus Scheiderer in Duisburg, from March 1 to August 31, 2002. After the end of his term he returned to Madrid.

Future appointments:

Several positions for young researchers are available within the next few months; it is expected that more positions will be added in the near future. Vacancies are usually advertised on the EC's CORDIS server at <http://improving.cordis.lu/rtn/>, in this Newsletter and on the Network's website at <http://www.ihp-raag.org/>.

The application deadline for some positions has expired; the successful candidates are:

- A post-doc position in Amsterdam for work with J. Bochnak, beginning January 1, 2003. Dr. M. Karas will be appointed to this position for 7 months.
- A post-doc position in Pisa for work with Francesca Acquistapace and Fabrizio Broglia, beginning March 1, 2003. Dr. J. Fernando will be appointed to this position for 6 months.

Vacancies

Currently no position is being advertised. However, decisions about several positions are expected within the next few weeks. Anybody interested in working for the Network can contact the Network Coordinator at all times.

Other positions

The Universität Konstanz in Germany offers a C4-position in real geometry. Here is text of the official announcement:

%%%%%%%%%

Ausschreibung

In der Mathematisch-Naturwissenschaftlichen Sektion, Fachbereich Mathematik und Statistik (Kennziffer 2002/110) ist zum Wintersemester 2004/05 eine

C4 - Professur für Geometrie

zu besetzen. Zu den Aufgaben gehört die Vertretung des Faches in Forschung und Lehre. Eine angemessene Beteiligung an den allgemeinen Lehraufgaben des Fachbereichs wird erwartet.

Es werden Bewerberinnen und Bewerber mit Forschungsschwerpunkt Geometrie, insbesondere reelle algebraische oder analytische Geometrie gesucht, die bereit sind,

sich an dem Aufbau des Schwerpunktes "Reelle Geometrie und Algebra" zu beteiligen.

Die Habilitation oder äquivalente Leistungen werden vorausgesetzt.

Bei der ersten Berufung in ein Professorenamt wird das Dienstverhältnis zunächst grundsätzlich befristet. Ausnahmen von der Befristung sind möglich, insbesondere, wenn die Bewerberin/der Bewerber aus dem Ausland oder aus dem Bereich außerhalb der Hochschulen kommt. Bei Fortsetzung des Dienstverhältnisses nach Ablauf des befristeten Dienstverhältnisses ist kein erneutes Berufungsverfahren erforderlich.

Die Universität bemüht sich um die Beseitigung von Nachteilen, die für Wissenschaftlerinnen im Bereich der Hochschule bestehen. Sie strebt eine Erhöhung des Anteils von Frauen in Forschung und Lehre an und begrüßt deshalb die Bewerbung von Frauen.

Schwerbehinderte werden bei entsprechender Eignung vorrangig eingestellt.

Bewerbungen mit den üblichen Unterlagen werden unter Angabe der Kennziffer bis 30. November 2002 erbeten an den Sprecher des Fachbereichs Mathematik und Statistik der Universität Konstanz, Prof. Dr. Alexander Prestel, Postfach D197, 78457 Konstanz.

%%%

Visits

- Vicki Powers of Emory University in Atlanta currently spends a year at the Universidad Complutense in Madrid (until July 2003).
- Vincent Astier is in Regensburg from September 1, 2002, to August 20, 2003, to work with Marcus Tressl.
- Alkadiri will visit Pisa from December 1 to December 8, 2002.
- Salma Kuhlmann visits the Universidad Complutense in Madrid at the beginning of November.

Network meetings

The Network organizes a large number of meetings: every year an Annual General Conference and several workshops in areas of active research, as well as schools that offer introductory courses about special topics. The future meetings that have been scheduled so far are:

- January 6–12, 2003, in Aussois, France,
Network school on
Spaces of arcs, motivic integration, real and analytic sets, arc-symmetric sets and blow-analytic equivalence

Organizers are Coste, Kurdyka, Parusinski.

- March 31 – April 5, 2003, in Pisa, Italy,
Annual General Network Conference (RAAG 2003)
Organizers are Acquistapace, Broglia, Schwartz
- June 25 – 28, 2003, in Lisbon, Portugal,
Network school on
o-minimal structures
Organizers are Edmundo, Richardson et al.
- June 29 – July 5, 2003, in Rennes, France,
Network school on
Computer applications of real geometry
Organizers are Coste, Gonzalez-Vega, Roy
- October 23 – 25, 2003, in Dortmund, Germany,
Network workshop on
Real Algebra
Organizers are Prestel, Scheiderer, Schwartz
- Annual General Network Conference RAAG 2004: Spain
Organizers are Andradas, Schwartz et al.
- Annual General Network Conference RAAG 2005: Germany
Organizers are Schwartz et al.

Information about these meetings, including links to, and addresses of, the websites and home pages, can be found on the Network's website (<http://www.ihp-raag.org/>) as they become available.

The First Annual General Network Conference (RAAG 2002) took place in Kazimierz Dolny, Poland, from September 22 (arrival day) to September 26, 2002.

The meeting was organized by S. Lojasiewicz, W. Domitrz, P. Goldstein, B. Jakubczyk, S. Janeczko, M. Marciniak, T. Mostowski, K. Nowak, W. Pawlucki, A. Ploski, K. Rusek, J. Stasica, Z. Szafraniec, N. Schwartz, C. Andradas, J. Bochnak, F. Broglia, M. Coste, D. Richardson

There were 66 participants altogether, 52 members of the Network (20 of them young researchers) and 14 other participants (one of them as an external expert).

The following is an alphabetically ordered list of lectures (those given by young researchers are marked "Y"):

- F. Acquistapace: Divisors in global real analytic sets.
- P. Adjmagbo: Proof of the real Jacobian Conjecture and of its real analytic generalizations.
- C. Andradas: Some consequences of the Artin-Lang property in non-compact analytic surfaces.
- L. Bröcker: Euler integration and Euler multiplication.
- J. Cimpric: On a problem of T. Craven and T. Smith.

- D. D'Acunto (Y): Gradient field of a definable family of functions. Uniform bounds on the length of the trajectories.
- M. Dickmann: Bounds for the representation of quadratic forms.
- A. Elkhadiri: On quasi subanalytic sets.
- J. Huisman: Real hypersurfaces having many pseudo-hyperplanes.
- I. Itenberg: Klein actions on K3-surfaces.
- T. Krasinski: The Lojasiewicz exponent of the gradient of a polynomial.
- L. Kubbe (Y): Uncountable families of non-isomorphic algebraic models.
- K. Kurdyka: General critical values for a polynomial mapping.
- G. Le Bouffant (Y): On the curvature of the deformation of a real analytic plane curve.
- L. Lopez de Medrano Alvarez (Y): Curvature of real algebraic curves.
- M. Marshall: Optimization of polynomial functions.
- P. Mormul: Codimension 2 singularities of Cartan-Goursat flags: Most of them are not simple.
- A. Nowel (Y): Analytically constructible functions and Noetherian families.
- W. Pawlucki: Differential functions on closed sets. The Whitney problem.
- A. Piekosz (Y): Extending analytic k -subanalytic functions.
- F. Pieroni (Y): Constructible functions on analytic 2-dimensional manifolds.
- R. Pierzchala (Y): Invariance of domain in o-minimal structures.
- G. Polotovskiy: On the maximal arrangements of cubics and quartics with common points in the odd branches of the cubics.
- V. Powers: Sums of squares, optimization and semidefinite programming.
- C. Scheiderer: Sums of squares on real algebraic surfaces.
- N. Schwartz: Partially ordered rings.
- R. Soufflet (Y): On the volume around definable families of definable sets.
- Z. Szafraniec: Topology of families of trajectories of analytic gradient fields.
- M. Tressl: A uniform model companion for differential fields in characteristic zero.
- D. Trotman: Equisingularity and real integral closure.
- G. Valette (Y): Sufficiency of jets via Lipschitz stratifications.
- N. Vorobjov: Betti numbers of semialgebraic and sub-Pfaffian sets.
- J.-Y. Welschinger: A real Gromov invariant and lower bounds in real enumerative geometry.
- L. Wilson: Local approximation of semialgebraic sets.

Other events

There are several meetings and events coming up in RAAG that are not organized by the Network.

- A bimester on *Topics in Complex and Real Geometry*, to be held in Pisa, Italy, from March 15 to May 15, 2003, organized by Broglia and Tomassini; web address: www.crm.sns.it;
- a Special Session on RAAG as part of the Joint Meeting of the AMS and the Spanish Math Society, June 18 – 21, 2003, in Sevilla, Spain, organized by Andradas, Diaz, Powers, Sottile; web address: visit the AMS' website, or: <http://www.us.es/rsme-ams/>;
- a Special Semester on *Topological Aspects of Real Algebraic Geometry*, January – May 2004, at the MSRI in Berkeley, USA, organized by Akbulut, Mikhalkin, Powers, Shapiro, Sottile, Viro; web address: visit the MSRI's website at www.msri.org.

Links to the websites of all these events are also available on the Network's website at <http://www.ihp-raag.org/>.

Lectures

Members of the Network gave the following lectures (outside Network meetings):

- V. Weispfenning: Linear motion planning. Conference ACA 2002, Velos, Greece
- A. Seidl: Cylindrical algebraic decomposition for real quantifier elimination within REDLOG. Conference ACA 2002, Velos, Greece
- Th. Sturm: Integration of quantifier elimination with constraint logic programming. Conference CALCULAMUS 2002, Marseille, France
- Th. Sturm: Quantifier elimination in term algebras. The case of finite languages. Conference CASC 2002, Simeiz, Ukraine
- V. Weispfenning: Comprehensive Gröbner bases and regular rings. Conference LMCS 2002, Hagenberg, Austria

Note on the reimbursement of travel expenses

A considerable part of the Network's budget is dedicated to travel expenses. As a rule, only Network researchers can be supported by Network money. Some exceptions are possible, but they must be approved in advance by the Network Coordinator. Considering the extensive meetings program and other traveling activities of Network researchers, it will be impossible to satisfy all requests for reimbursement of travel expenses. The organizers of Network meetings are always encouraged to look for supplementary funding. If and when the Network runs out of travel money, the individual researchers themselves will have to search for other sources of support. The Network does not accept a legal or moral obligation to pay all expenses of all its researchers.

New preprints and publications

Marcus Tressl (Marcus.Tressl@mathematik.uni-regensburg.de) and his deputy Tobias Kaiser (tobias.kaiser@mathematik.uni-regensburg.de) are responsible for posting preprints and publications on the Network's website. Their preprint server can be reached via a link on the Network's website (<http://www.ihp-raag.org/>), or directly at http://www.uni-regensburg.de/Fakultaeten/nat_Fak_I/RAAG/. All Network researchers are asked to make every new preprint available to them so that it can be added to the website. This is an important part of the intended function of the website as an information center on RAAG.

Here is a list of new preprints and publications by Network researchers:

- M. Knebusch, D. Zhang, *Manis Valuations and Prüfer Extensions I*, Lecture Notes in Mathematics, Springer-Verlag, Berlin 2002
- E. Bierstone, P. Milman, W. Pawlucki: *Differentiable functions defined in closed sets. A problem of Whitney*. Invent. Math. – to appear
- Z. Szafraniec: *Topological invariants of real Milnor fibres*. Manuscripta Math. – to appear.
- A. Nowel, Z. Szafraniec: *On trajectories of analytic gradient vector fields*. J. Diff. Equations 184 (2002), 215-223
- A. Prestel, N. Schwartz: *Model Theory of Real Closed Rings*. Fields Institute Comm. **32**, pp. 261 – 290 (2002)
- José F. Fernando, Jesús M. Ruiz, Claus Scheiderer: *Sums of squares in real rings*.
- Michel Coste, Jesús M. Ruiz, Masahiro Shiota: *Global Problems on Nash Functions*.
- A. Andradas, A. Díaz-Cano: Closed stability index of excellent henselian local rings.
- F. Acquistapace, F. Broglia, M. Shiota: *The Hörmander-Lojasiewicz inequality in global semianalytic geometry*.
- F. Broglia, F. Pieroni: *Separation of global semianalytic subsets of 2-dimensional analytic manifolds*.
- F. Acquistapace, A. Díaz-Cano: *Divisors in Global Analytic Sets*.
- J. Huisman: *Real hypersurfaces having many pseudo-hyperplanes*.
- V. Astier, M. Tressl: *Axiomatization of local-global principles for pp-formulas in spaces of orderings*.
- Claus Scheiderer: *Sums of squares on real algebraic curves*.
- C. Andradas, R. Rubio, M.P. Vélez: *An Algorithm for convexity of semilinear sets over ordered fields*.
- Z. Szafraniec: *Topological invariants of real Milnor fibres*.
- Didier D'Acunto, Krzysztof Kurdyka: *Gradients of a definable family of functions: Uniform bound on the length of the trajectories*.
- Markus Schweighofer: *On the complexity of Schmüdgen's Positivstellensatz*.

- Maria Jesus de la Puente: *Real Plane Algebraic Curves*.
- Z. Jelonek, K. Kurdyka: *Quantitative generalized Bertini-Sard Theorem for smooth affine Varieties*.
- J. Bochnak, W. Kucharz: *On approximation of smooth submanifolds by nonsingular real algebraic subvarieties*.
- J. Bochnak, W. Kucharz: *A topological proof of the Grothendieck formula in real algebraic geometry*.
- V. Weispfenning: *Canonical comprehensive Gröbner bases*. Proc. ISSAC 2002
- Th. Sturm, V. Weispfenning: *Quantifier elimination in term algebras. The case of finite languages*. Proc. CASC 2002
- V. Weispfenning: *Comprehensive Gröbner bases and regular rings*. Proc. LMCS 2002
- A. Dolzmann, V. Weispfenning: *Linear motion planning*. Proc. ACA 2002
- Th. Sturm: *Integration of quantifier elimination with constraint logic programming*. Proc. CALCULEMUS 2002

Next newsletter

The next issue of the Newsletter will be published on January 2, 2003.