

Algebraic K -Theory, Linear Algebraic Groups, and Related Structures

RTN Network HPRN-CT-2002-00287

Periodic Progress Report 1.10.2002 – 30.09.2003

Network Full Title:	Algebraic K -Theory, Linear Algebraic Groups, and Related Structures
Network Short Title:	K -Theory and Algebraic Groups
Network Home Page:	http://www.mathematik.uni-bielefeld.de/K+AG/
Commencement Date:	1.10.2002
Duration of Contract:	48 months
Period covered by this report:	1.10.2002 – 30.09.2003
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Part A – Research Results

A.1 Scientific Highlights

- The network is proud of having been selected to be represented by a survey talk at the 4ECM (Fourth European Congress of Mathematics, Stockholm, June 27 – July 2, 2004 ¹), and it was decided that one of the postdoctoral scientists of the network, Marina Monsurro (Team 9: Lausanne), shall give that representation².
- The local coordinator of our Tbilisi team (team 12), Teimuraz Pirashvili, was awarded the well recognized “Alexander von Humboldt Prize”, which allows him to stay a longer period of time at the university of Bielefeld (team 1, partially during the reporting period).
- The local coordinator of our Regensburg team (Team 2), Susanne Pumplün, was awarded the Habilitationspreis of the University of Regensburg for her excellent thesis.
- Ahmed Laghribi from Casablanca, Morocco) was awarded an Alexander v. Humboldt Fellowship for a research stay at the math department at Bielefeld, but since he has been a resident in EU states (France and Belgium) for more than five years he has been given a position as a young researcher in this network.
- Kirill Zainoulline from St. Petersburg (Team 13) was awarded an Alexander v. Humboldt Fellowship for a one years stay at the math department of Bielefeld University (Team 1). His research proposal is certainly along the main stream of this network.

Since Kirill is in the age of a young researcher (but not eligible for an employment in the framework of this network) we will treat him in the same way as any young researcher.

- The following workshops have been held during the reporting period:
 - * May 5–9, 2003, Regensburg (Team 2): Workshop on “The Generic Splitting of Quadratic Forms”³
 - * June 24–26, Lens: Workshop on “Quadratic Forms” (Team 5: Louvain)
 - * June 30–July 4, 2003, Besançon: Workshop on “Algebraic Groups, Quadratic Forms and Related Topics” (Team 3)

All these workshops have been attended by many young researchers from almost all other teams and had a considerable training effect.

¹<http://www.math.kth.se/4ecm/>

²<http://www.math.kth.se/4ecm/program/european.nw.lectures.html>

³<http://www-nw.uni-regensburg.de/~.asv11938.mathematik.uni-regensburg.de/workshop.html>

- Many research projects mentioned in the workplan have been successfully approached, which is documented by numerous publications which are not “Joint Publications” in the sense of this network – and therefore are not listed here – but also by a pretty high number of “Joint Publications” as listed below.

A.2 Joint Publications

Manuscripts with at least one of our young researchers as an author have been marked by (Y).

Teams 3+1: (Y) Detlev W. Hoffmann and Ahmed Laghribi: Isotropy of quadratic forms over the function field of a quadric in characteristic 2 (29 p.) to appear.

<http://www.mathematik.uni-bielefeld.de/LAG/>, nr 129.

Teams 3+1: (Y) Detlev W. Hoffmann, Ahmed Laghribi: Quadratic forms and Pfister neighbors in characteristic 2 (33 p.)

<http://www.mathematik.uni-bielefeld.de/LAG/>, nr 103.

Teams 1+13: I. Panin, U. Rehmann: A Variant of a Theorem by Springer (8 p.)

<http://www.mathematik.uni-bielefeld.de/LAG/>, nr 126.

Teams 8+2: (Y) Karim Johannes Becher, Detlev Hoffmann: On symbol lengths in Milnor K-theory (18 p.), to appear.

<http://www.mathematik.uni-bielefeld.de/LAG/>, nr 115

Teams 9+5: M.-A. Knus, J.-P. Tignol: Quartic Exercises (49 p.)

<http://www.mathematik.uni-bielefeld.de/LAG/>, nr 106 IJMMS, in print.

Teams 9+5: (Y) G. Berhuy, M. Monsurro, J.-P. Tignol: Cohomological invariants and R-triviality of adjoint classical groups (10 p.)

<http://www.mathematik.uni-bielefeld.de/LAG/>, nr 95

Teams 2+12: J. Casas, J.-L. Loday, T. Pirashvili, *Leibniz n -algebras*, Forum Mathematicum **14** (2002), 189–207.

Teams 4+1: (Y) B. Kahn, A. Laghribi: A second descent problem for quadratic forms, to appear in *K*-theory.

Teams 8+5: (Y) David Lewis, Thomas Unger, Jan Van Geel, Hasse principle for similarity of hermitian forms, preprint.

Teams 7+11: C. Pedrini and V. Guletskii :The Chow Motive of the Godeaux surface, Algebraic geometry, A volume in Memory of Paolo Francia, W.de Gruyter 2002 ,179-195

Teams 7+11: C.Pedrini and V. Guletskii :Finite dimensional Motives and the Conjectures of Beilinson and Murre to appear on K-theory: a Volume in Honour of H.Bass,(2003) 2002

Teams 2+8: (Y) S Pumplün and T.Unger, The hermitian level of composition algebras, Manuscripta Mathematica 109 (2002), 511 - 525.

Teams 10+11: B.E. Kunyavskii, L.H. Rowen, S.V. Tikhonov, and V.I. Yanchevskii, Bicyclic algebras of prime exponent over function fields, Preprint, 33 pp., submitted.

Teams 5+11: D.F. Bazyleu, J. van Geel, and V. I. Yanchevskiĭ. Indices of Ω -algebras with special ramification (in preparation).

Teams 5+11: J. van Geel, S.V. Tikhonov, and V. I. Yanchevskiĭ. Pythagoras number of function fields of hyperelliptic curves with good reduction (in preparation).

Teams 1+12 W. Bruns and J. Gubeladze, Higher polyhedral K -groups. *J. Pure Appl. Algebra* 184 (2003), no. 2-3, 175–228

Teams 1+12 W. Bruns and J. Gubeladze. Divisorial linear algebra of normal semi-group rings. *Algebr. Represent. Theory* 6 (2003), no. 2, 139–168.

Teams 2+13 Hornbostel, J., Yagunov, S. Rigidity property for Hensel local rings. (in preparation)

Teams 1+9+13 (Y) Ojanguren M., Panin, I., Zainoulline, K. On Norm principle for quadratic forms. Preprint 2003

Part B – Comparison with the Joint Programm of Work (Annex I of the Contract)

B.1 Research Objectives

The research objectives, as set down in the Work Programme (Annex I of the contract) are still relevant and achievable.

B.2 Research Method

No change of the research method turned out to be necessary.

B.3 Workplan

All the events scheduled in the workplan until September 2003 have been taken place⁴ - except for the Trento Summer School “K-Theory and its applications to Algebra and Topology”, which could not be realised, but will be replaced by a Summer School with title more precisely specialized in: “Motives, K-theory and Arithmetical Geometry”, which will be held in Sestri Levante, near Genova (Italy), during the week June 28-July 2, 2004. The topic has slightly changed, taking into account actual scientific developments.

The workplan for the next reporting period is scheduled as foreseen in Annex I of the contract, except that the workshop in Bar-Ilan will take place already in February rather than in May and the Summerschool in Edinburgh will be postponed by one year (reason: too many other important events in Summer for this network in 2004), and that the Midterm Review Meeting will be postponed – (reason: the network started five months later than expected when Annex I was set up).

⁴even those which were scheduled before the actual start of the network on Sept. 1, 2002

Professional research effort on the network project (1 st reporting period)			
Participant	Young researchers to be financed by the contract (person-months)	Researchers to be financed from other sources (person-months)	Researchers likely to contribute to the project (number of individuals)
	(a)	(b)	(c)
1. Bielefeld	8	36	18
2. Regensburg	7	15	9
3. Besancon	12	36	18
4. UP7	0	36	17
5. UCL	18	36	17
6. DIMA	2	24	12
7. UEDIN	3	21	9
8. NUID/UCD	6	21	9
9. EPFL	0	57	22
10. Bar-Ilan	0	18	10
11. Minsk	0	6	3
12. RMI	0	14	7
13. RAS	0	10	5
Totals	56	330	156

B.4 Organisation and Management

B.4.1

The network is organized along the rules which have been set up in the work programme section 4. Various visits for collaboration of single scientists at other nodes have been undertaken.

Decisions relevant for the network were made on the basis of email discussions and by personal contact during the network events.

Dissemination and communication of research results were done by the network's preprint server.

This server published, within the reporting period, 23 manuscripts.

It is already accepted as a dissemination and publication basis by scientists worldwide working in the area of this network.

B.4.2

The relevant network meetings have been listed in section A.1, as they are considered as highlights.

C. Pedrini has represented the Network at the International Conference on: “The Arithmetic, Geometry and Topology of Algebraic Cycles” in Morelia (Mexico) from June 25 2003 to July 5 2003 The event was directly related to the joint research performed in the network. C. Pedrini gave an invited talk on “finite dimensional Motives” exposing the joint research with V. Guletskii.

B.4.3

Tabular description of the networking which has taken place during the reporting period:

From/To	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Bielefeld		v	vp	p					p	c		p	p
2 Regensburg	c							vp				p	c
3 Besançon	vp	v			cy					c		c	
4 U Paris 7	p	v			v	c							
5 Louvain		v	c					p	p	c	c		
6 Genova				v							p		
7 Edinburgh										c			
8 Dublin		vp			p								
9 Lausanne	1	v			p								pc
10 Bar-Ilan	vc		v		vc		c					v	
11 Minsk	v				vc	p				c			
12 Tbilisi	vps	p	c							c			
13 St. Petersburg	vps	c							pc				

p=joint publication,

v=Visit(e.g. for workshop or seminar),

s=secondment (possibly financed by other grants like Humboldt Fellowships or Prizes)

y=young scientist secondment

c=active cooperations (in the sense of preparing publications, joint seminars)

Beyond these mentioned direct cooperations, there were many others. For example, during the reporting period there was a conference at Talca, Chile, on Quadratic Forms and related topics, in December 2002, at which scientists from most nodes actively participated.

B.5 Training

B.5.1 Advertisement of open positions on various web pages:

- own network's home page:
<http://www.mathematik.uni-bielefeld.de/K+AG/>
- befriended international networks' home pages and others like:
<http://www.math.uiuc.edu/K-theory/>
<http://www.lehigh.edu/dmd1/algtop.html>
- but also on universities' and departments' home pages.

As the tables below and in Part C show, more than 50% of the deliverable person-months have already been committed now.

B.5.2 Table to compare progress in recruitment of young researchers with the plan of the contract:

The table shows that 56 person-months of training have already been given in the first period. However, at several sites, in the first year, training was done with financial support from other sources.

The table in part C shows that, at this time, already more than half of the deliverable person-months have been contracted.

Participant	Contract deliverable of Young Researchers to be financed by the contract (person-months)			Young Researchers financed by the contract so far (person-months)		
	Pre-doc (a)	Post-doc (b)	Total (a+b)	Pre-doc (c)	Post-doc (d)	Total (c+d)
Bielefeld		44	44		8	8
Regensburg		33	33	1	6	7
Besançon		53	53		12	12
U Paris 7		28	28		0	0
Louvain(UCL)		36	36	6	12	18
Genova(DIMA)		36	36	2	0	2
Edinburgh(UEDIN)		15	15		3	3
Dublin(NUID/UCD)		15	15		6	6
Lausanne(EPFL)		30	30		0	0
Bar-Ilan		30	30		0	0
Minsk		0	0		0	0
Tbilisi		0	0		0	0
St. Petersburg		0	0		0	0
TOTAL	0	320	320	9	47	56

B.5.3, B.5.4 The young researchers have been integrated to the research seminars given at the universities, as well as other research activities like local conferences and workshops. They were given the opportunity to participate in the workshops organized by the network, in which particular survey and introductory courses into various special subfields of the network's research objectives were given by experienced and senior scientists.

B.6 Difficulties

No administrative or procedural difficulties were encountered so far .

Part C – Summary Reports by Young Researchers

List of contracts with Young Researchers

The two columns “months contracted” give the number of months in this reporting period (first column) and the number of months already contracted in total. Some nodes have not used their money from this network in the first year, because they were able to use money for postdoc training from other sources.

In total the table shows that the network was already able to contract more than half of their “deliverable” months.

(One line for each contract, first and last month of contract are given in the respective year column. In case of 1-months-contracts only this month is indicated.)

Name	Participant	Months contracted		Begin/End of Contract					Report included
		this period	total so far	2002	2003	2004	2005	2006	
Avitabile	Regensburg	1	1		07				yes
Astier	Regensburg	1	16		09	1			
Becher	Louvain		6			04 09			
Calmes	Regensburg	1	6		09	02			
Calmes	Bielefeld		6			03 08			
Canepa	Genova	1	2		09	10			yes
Delaunay	Lausanne		12		10	09			
Felisatti	Dublin	6	6	10	03				yes
Frings	Louvain	12	12	10	09				
Garcia	Regensburg	1	1		08				yes
Laghribi	Bielefeld	8	41		02			09	
Nespolino	Louvain	6	6		03 08				yes
Nespolino	Besançon		11		10	08			
Ntokas	Besançon	12	15	10	12				
Paugam	Regensburg	1	11		09	07			
Renaudin	Edinburgh	3	3		07 09				yes
Sixt	Louvain		2		11 12				yes
Unger	Regensburg	1	1		03				yes
Unger	Regensburg	1	1		06				yes
Villa	Dublin		9		10	06			
TOTAL		55	168						

Reports by those scientists marked “yes” are appended.

The Updated Database Report

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The Annual Cost Statements

13 Cost statements are appended.