

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

RTN Network HPRN-CT-2002-00287

Final & Last Periodic Progress Report 1.10.2005 – 30.09.2006

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.math.uni-bielefeld.de/K+AG/
Commencement Date:	1.10.2002
Duration of Contract:	48 months
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Part A – Research Results

A.1 Scientific Highlights

- A workshop on “Algebraic K-Theory, Linear Algebraic Groups, and Related Structures” was held at Bielefeld (Team 1) on Feb. 9 – 11, 2005. All nodes participated here. The workshop was intended to give the participating scientists of the network an occasion to present and discuss their actual research. 18 talks have been presented, out of these 13 were given by recent and former “young researchers” of this network, the others were given by senior scientists from the network.

The contents of the talks are documented at our web server under <http://www.math.uni-bielefeld.de/LAG/man/178.html>

- The Bielefeld department succeeded in obtaining a major national long term grant, CRC 701 “Spectral Structures and Topological Methods in Mathematics” (cf. <http://www.math.uni-bielefeld.de/sfb701/cgi-bin/index.pl?lang=EN>), in which research projects are embedded which are close to the subject of this network, among others there are:

Project C.2: “Linear algebraic groups over arbitrary fields”

Project C.4: “Milnor conjecture, Galois cohomology and algebraic cobordism”

The scientific research work of this network substantially helped to obtain this grant, which is used in a similar way as this network to combine research and training of young scientists.

Already now, training and research at the Bielefeld node are substantially enhanced by the events and activities of this grant.

This grant started on July 1, 2005, and will run for four years (upon positive re-evaluation after that time, two further four years terms are possible).

- Ivan Panin and Kirill Zainoulline from St. Petersburg (Team 13), had been appointed for some longer term temporary positions by the Bielefeld node, where they work in the context of the CRC 701 as well as of this network.
- Several former “Young Scientists” of this network obtained permanent positions:
 - ★ Grégory Berhuy, former postdoc of the network, obtained a permanent position (lecturer) at the University of Southampton, UK
 - ★ Christophe Delaunay, former postdoc of the network, obtained a permanent position (maître de conférences) at the University of Lyon, France
 - ★ Marina Monsurro, former postdoc of the network, obtained a tenure-track position (associate professor) at the University of Roma 2, Italy
 - ★ Leonardo Zapponi, former postdoc of the network, obtained a permanent position (maître de conférences) at the University of Paris 6, France.

As in the preceding reporting periods, a series of lectures on advanced topics, and several workshops, seminars and discussion groups were organized:

The following workshops and conferences have been held during the reporting period and are to be considered as scientific highlights as well. All these events are documented in more detail on the home page of our network:

<http://www.math.uni-bielefeld.de/K+AG/>

- February 8–9, 2005 Midterm Review, Bielefeld, followed by a 2-days workshop for postdoctoral researchers: Schedule and scans of the talks are given here: <http://www.math.uni-bielefeld.de/LAG/man/178.html>
- EPFL-ETHZ Number Theory Days, March 31 - April 1, 2005 (organisers : Eva Bayer-Fluckiger and Richard Pink).
- Operads 2005: Conference at CIRM, Luminy (near Marseilles, France) from Monday 4th April to Friday 8th April 2005

There were 51 participants, coming from different countries, many of them from the different nodes of the K-theory network. The Conference was sponsored by the K-theory network, the Société Mathématique de France, the CNRS, the Université Louis Pasteur de Strasbourg, and the Université de Lyon. It was a great scientific success.

- June 27–July 1, 2005 "Algebraic K- and L-theory of Infinite Groups", Workshop at Edinburgh <http://www.ma.hw.ac.uk/icms/meetings/2005/klig/index.html>
The workshop had 35 participants from 12 countries, the scientific programme consisted of 19 formal lectures (including lectures by young researchers of this network), which stimulated many informal discussions. Its evaluation by the participants stresses its scientifically stimulating atmosphere.
- July 25-29, 2005: Workshop in Lausanne (organisers : Eva Bayer-Fluckiger and Karim Becher) <http://alg-geo.epfl.ch/workshops/qflag/index.html>
- September 9–16, 2005 Nottingham: Workshop on linear algebraic groups and related structures
- 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 the "Joint Publications" as listed below.

A.2 Joint Publications

Teams 3+5: Anne Cortella and Jean-Pierre Tignol, *Skolem-Noether pour les endomorphismes sur un anneau principal*, Journal de théorie des nombres de Bordeaux, to appear.

Teams 3+12 Fruitful discussions with Pirashvili which gave rise to papers on both sides.

Teams 4+12 Vincent Franjou, T. Pirashvili: Comparison of abelian categories recollements. Documenta Math. 9 (2004), 41–56

Teams 4+12 Vincent Franjou, T. Pirashvili: Strict polynomial functors and coherent functors (preprint)

Teams 4+6 B. Kahn, C. Pedrini, and J. P. Murre: On the transcendental part of the motive of a surface, to appear in the proceedings of the Murre conference

Teams 4+6 L.Barbieri-Viale and B.Kahn : On the derived Category of 1-motives ,preprint (2005)

Teams 5+11 D.F. Bazyleu, J. Van Geel, V.I. Yanchevskiï, On conic bundle surfaces over Henselian discrete valued fields with real closed residue field, preprint

Teams 5+11 S.V. Tikhonov, J. Van Geel, V.I. Yanchevskiï, Concerning pythagoras numbers of function fields of hyperelliptic curves with good reduction over hereditarily pythagorean fields in preparation

Teams 5+14 D.W. Hoffmann, A. Laghribi, Isotropy of quadratic forms over the function field of a quadric in characteristic 2. Journal of Algebra (in press).

Teams 5+1 J. Hurrelbrink, N. Karpenko, U. Rehmann, The minimal height of quadratic forms of given dimension, to appear in Archiv of Math.

Teams 9+14 E. Bayer–Fluckiger, G. Berhuy and P. Chuard–Koulmann, CM–fields and skew–symmetric matrices, *Manuscripta Math.*, **114** (2004), 351–359.

Teams 9+6 E. Bayer–Fluckiger, M. Monsurro, R. Parimala et R. Schoof, Trace forms of Galois algebras over fields of cohomological dimension ≤ 2 *Pacific J. Math*, **217** (2004), 29-43.

Teams 1+10 H. Abels, G. Margulis, and G. Soifer, The linear part of an affine group leaving a form of signature (p,q) invariant, preprint, Bielefeld, 2005, 58pp.

Teams 4+10 J.-L. Colliot-Thélène and B. Konyavskii, Groupe de Picard et groupe de Brauer des compactifications lisses d’espaces homogènes, preprint math.AG/0502516, to appear in J. Algebraic Geom.

Teams 10+11 B.E. Konyavskii, L.H. Rowen, S.V. Tikhonov, and V.I. Yanchevskii, Division algebras that ramify only on a plane quartic curve, to appear in Proc. Amer. Math. Soc.

Teams 5+10 L. H. Rowen, A. S. Sivatski, and J.-P. Tignol, Division algebras over rational function fields in one variable, In: Algebra and Number Theory, Proc. of the Silver Jubilee Conf., Univ. of Hyderabad (R. Tandon, ed.), Hindustan Book Agency, New Delhi, India, 2005, pp. 158-180.

Teams 1+4+13 B.Calmes, K.Zainoulline, N.Semenov, V.Petrov. Chow motives of twisted flag varieties. to appear in *Composition Math.* 2006 (St.Petersburg-Bielefeld-Paris)

Teams 1+9+13 M.Ojanguren, I.Panin, K.Zainoulline. On the norm principle for quadratic forms. *J. Ramanujan Math. Soc.* 19 (2004), no.4, 1-12 (Lausanne-Bielefeld-St.Petersburg)

Teams 1+13 A.Nenashev, K.Zainoulline. Oriented cohomology and motivic decompositions of relative cellular spaces. to appear in *J. Pure and Applied Algebra* 2005 (Bielefeld - St.Petersburg)

Teams 1+13 J. Hornbostel, S.Yagunov. Rigidity for henselian local rings and A^1 -representable theories. submitted to *Math. Zeitschrift.* 13pp. (Regensburg - St. Petersburg)

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 2005 have taken place, including some more like the workshops in Lausanne and in Luminy.

The workplan for the next reporting period is scheduled as foreseen in Annex I of the contract, except that the final postdoc conference at Bielefeld in September is replaced by a conference for a broader audience (“Hermann Weyl Conference”). Moreover, a few more workshops in Strasbourg and Edinburgh have been scheduled.

Professional research effort on the network project (3 rd 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	18	36	18
2. Regensburg	11	15	9
3. Besancon	7	18	9
4. UP7	12	36	17
5. UCL	5	36	17
6. DIMA	17	24	12
7. UEDIN	1	21	9
8. NUID/UCD	0	21	9
9. EPFL	4	57	22
10. Bar-Ilan	8	18	10
11. Minsk	0	6	3
12. RMI	0	14	7
13. RAS	0	10	5
14. Nottingham	0	72	9
Totals	95	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, since the beginning of the reporting period, 53 manuscripts dealing with topics closely related to the network research, written by authors from all over the world, plus 6 Lectures given at the Network Conference: Motives, K-theory and Arithmetical Geometry Summer School & Workshop, Sestri Levante (Genova, Italy) June 28 - July 2, 2004.

The server 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 : "Workshop on Algebraic K-theory 2004" at CRM, Montreal (Canada) ,from Oct 2 to Oct 8 2004, where he gave an invited talk "On the Chow Motive of an algebraic surface
- Eva Bayer-Fluckiger represented the network at the BANFF conference *Applications of Galois cohomology to torsors and Lie theory*, with an invited talk (Trace forms of G -Galois algebras). (as well as in seminar and colloquium talks in Rényi Institute, Budapest, Université de Montpellier, Universität Aachen, Braunschweig Hannover)
- Several other scientists represented the network at various international occasions.

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	14
1 Bielefeld				p	p				vp	p	c	c	cp	
2 Regensburg	v													v
3 Besançon	v				p				v		p	c	v	v
4 U Paris 7	vp					p			v	p		p		
5 Louvain	vp		vp						v	p	p			p
6 Genova	v			vp					p					
7 Edinburgh	v													
8 Dublin	v													
9 Lausanne	vp		v	v	v	p								p
10 Bar-Ilan	vp				p						p			v
11 Minsk	cv		p	vp	p	p		v		p				v
12 Tbilisi	cv			cp	v					c				
13 St. Petersburg	scvp	p		v	p			v	pc	v				
14 Nottingham	v		v		p	p			p					

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 between the nodes, there were many other cooperations.

Remark Starting August 1, 2005, Nottingham as a new node was integrated into the network. The workplan has been adjusted accordingly.

The Nottingham node takes over some of the activities of the Regensburg and Besançon node, and will be financed by some of their resources. Therefore, the nodes Regensburg and Besançon did not provide a financial forecast for the 4th reporting period. Instead, a financial forecast for Nottingham is given, providing a substantial amount of training.

B.5 Training

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

- own network's home page:
<http://www.math.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 the home pages of the universities and departments involved.

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

The table below shows that more than the contractual number of person-months in training could be contracted (376 compared to the deliverable of 320).

At several sites, additional training from other sources was given as well (e.g., Marie Curie and A.v. Humboldt fellowships as well as from national grants) in the context of the network research topics.

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		55	55
Regensburg		33	33	14	27	41
Besançon	9	29	38	14	24	38
U Paris 7		28	28		32	32
Louvain(UCL)	12	24	36	12	24	36
Genova(DIMA)	12	24	36	2	32	34
Edinburgh(UEDIN)		15	15		13	13
Dublin(NUID/UCD)		15	15		13	13
Lausanne(EPFL)		30	30		60	60
Bar-Ilan		30	30		31	31
Minsk		0	0		0	0
Tbilisi		0	0		0	0
St. Petersburg		0	0		0	0
Nottingham	3	12	15	0	23	23
TOTAL	36	284	320	42	334	376

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

Some organisational difficulties have been reported because of the delay of the contract amendment concerning the integration of the Nottingham node.

Apparently this has been overcome, and no further actions are necessary here.

Part C – Summary Reports by Young Researchers

A list of contracts with Young Researchers is given on the next page.

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.

In total the table shows that the network was already now able to contract more than their "deliverable" person-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	Mths. contr.		Begin/End of Contract					Rep. incl.
		this p.	tot.	2002	2003	2004	2005	2006	
Astier	Regensburg	0	16		09 12	08	07		
Avitabile	Regensburg	0	1		07				
Bartels	Edinburgh	0	0					02	yes
Becher	Louvain	0	6			04 09			
Bois	Bar-Ilan	9	9				12	08	yes
Calmès	Bielefeld	0	12			03 08	03 08		
Calmès	Louvain	0	6			09	02		
Calmès	Regensburg	0	6		09	02			
Canepa	Genova	0	2		09 10				
Delaunay	Lausanne	0	9			04 07 09	01		
De Villa	Dublin	1	8		10	03		09 09	yes
De Wannemaker	Besancon	0	3				06 08		
Diaz-Toca	Besancon	2	3				07 07	11 12	yes
Felisatti	Dublin	0	6	10	03				
Florence	Bielefeld	12	12				10	09	yes
Friedl	Edinburgh	1.5	2.5			04 04		08 09	yes
Frings	Louvain	0	12	10	09				
Garcia	Regensburg	0	2		08 08	07 07			
Gomez	Regensburg	0	1			07			
Grenier-Boley	Nottingham	11	11				10	08	yes
Guffroy	Genova	8	24			06		05	yes
Haesemeyer	Paris	0	2			06 07			
Hanke	Bar-Ilan	9	9					01 09	yes
Hornbostel	Paris	0	2			04 05			
Laghribi	Bielefeld	0	19		02	08			
Lara	Lausanne	12	12				10	09	
Lequeu	Bielefeld	0	12			10	09		
Lequeu	Nottingham	12	12				10	09	yes
Maakestad	Paris	7	15				02	04	yes
Machura	Bar-Ilan	5	13				02	02	yes
Mazza	Paris	0	12			01 08 10	01		
Nespolino	Besancon	0	11		10	08			
Nespolino	Louvain	0	6		03 08				
Ntokas	Besancon	0	19	10	12		04 07		
O'Shea	Louvain	4	4					02 05	yes
Paugam	Regensburg	0	11		09	07			
Popov	Besancon	0	2				06 07		
Rebolledo	Lausanne	12	12				10	09	
Renaudin	Edinburgh	0	6		07 12				
Schlichting	Edinburgh	1.5	1.5					07 08	yes
Schlichting	Paris	0	1			06			
Sixt	Edinburgh							08	yes
Sixt	Louvain	0	2		11 12				
Surroca	Lausanne	12	12				10	09	
Thomas	Lausanne	12	12				10	09	yes
Thullier	Regensburg	2	3				09 11		yes
Unger	Regensburg	0			3 3 6 6	3 3 6 6			
Varisco	Edinburgh	1	2				09 10		
Velusek	Regensburg	0	1			06			
Wenger	Genova	3	8				05 12		
Wittmann	Lausanne	0	3		10 12				
TOTAL		138	376	Reports by those marked "yes" are attached.					

The Updated Database Report

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The Annual Cost Statements

13 Cost statements are appended.