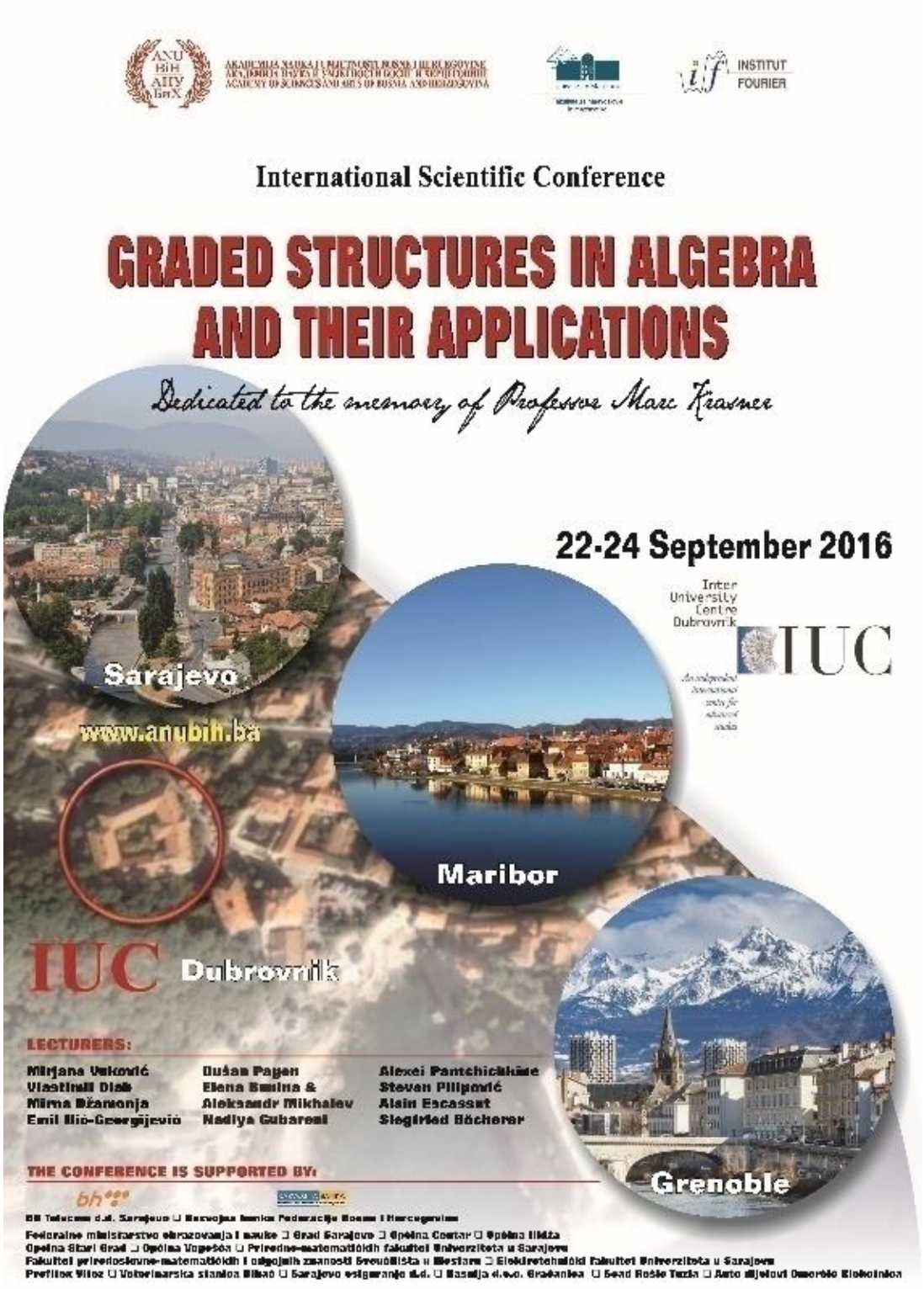

AKADEMIJA NAUKA I UMJETNOSTI BOSNE I HERCEGOVINE
INSTITUT FOURIER
International Scientific Conference
GRADED STRUCTURES IN ALGEBRA AND THEIR APPLICATIONS
Dedicated to the memory of Professor Marc Krasner
22-24 September 2016
Inter University Centre Dubrovnik
IUC
Sarajevo
www.anubih.ba
Maribor
IUC Dubrovnik
Grenoble
LECTURERS:
Mirjana Vuković
Vlastimil Dlab
Mirna Džamonja
Emil Ilić-Georgijević
Dušan Pagon
Elena Rubina &
Aleksandr Mikhalev
Nadiya Gubareni
Alexei Pantchichkine
Steven Pilipović
Alain Escassut
Siegfried Böcherer
THE CONFERENCE IS SUPPORTED BY:

ACADEMY OF SCIENCES AND ARTS OF BOSNIA AND HERZEGOVINA
DEPARTMENT OF NATURAL SCIENCES AND MATHEMATICS

in co-operation with

INSTITUTE FOURIER, UNIVERSITY JOSEPH FOURIER (GRENOBLE 1)
FRANCE

and

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCES,
UNIVERSITY OF MARIBOR, SLOVENIA

INTERNATIONAL SCIENTIFIC CONFERENCE
„GRADED STRUCTURES IN ALGEBRA AND THEIR APPLICATIONS"

dedicated to the memory of Professor Marc Krasner

Dubrovnik, September 22-24, 2016

PROGRAMME
ABSTRACTS
BIOGRAPHIES

SARAJEVO, 2016

INTERNATIONAL SCIENTIFIC COMMITTEE

Academician Fikret Vajzović (ANUBiH), vice chairperson

Prof. Dr. Mirjana Vuković, corresponding member of ANUBiH (ANUBiH), chair person

Prof. Dr. Alexei Pantchichkine (University Joseph Fourier), vice chairperson

Prof. Dr. Dušan Pagon (University of Maribor), vice chairperson

Prof. Dr. Vlastimil Dlab, FRCS (Carleton University), member

Prof. Dr. Alexander Vasilevich Mikhalev (Moscow State University - Lomonosov), member

Academician Stevan Pilipović (University of Novi Sad), member

ORGANISING COMMITTEE

Academician Dejan Milošević, (ANUBiH), vice president

Prof. Dr. Mirjana Vuković, corresponding member of ANUBiH (ANUBiH), president

Assist. Prof. Dr. Emil Ilić-Georgijević (University of Sarajevo), member

MSc. Amra Avdagić (ANUBiH), vice president

Belinda Kikić (ANUBiH), member

Nerma Tanović (ANUBiH), member

INTERNATIONAL SCIENTIFIC CONFERENCE

„GRADED STRUCTURES IN ALGEBRA AND THEIR APPLICATIONS"

dedicated to the memory of Professor Marc Krasner

Marc Krasner

Odessa 1912 – Paris 1985

Professor and Professor Emeritus of the University „Pierre et Marie Curie" from Paris
Officier des Palmes de l'Académie des Sciences de Paris
and
first laureate of the award
„Prix Doistau-Blutet" de l'Académie des Sciences de Paris
in the field of mathematics (*for* 1958).

Dubrovnik
September 22-24, 2016

Marc Krasner

great French mathematician of Jewish-Russian origin

distinguished for many fundamental contributions in:
Abstract Algebra – especially Abstract Galois's Theory,
Number Theory, Ultrametric Analysis, Logique and Fundaments,
Philosophy of Science, and History of Mathematics,
as well as
General Graded Structures (*groups, rings, modules*).

In the memories from school days, especially
of outstanding teacher of mathematics

Adrian Feofanovich Tchivchinski,

who was his teacher in the last three grades of elementary school,
there are traces of Krasner's definitive commitment to mathematics.

Already at that time, as an 11-12-year-old boy,
Krasner got a specific information on non-Euclidean geometry and
tried to prove

Euclid's fifth postulate.

Almost since the very arrival to France in 1928, he was occupied with
Fermat's Last Theorem.

About the result he reached in connection with that problem:

L. J. Mordell *wrote to him„Your result is very striking",*
and
P. Ribenboim *wrote in his book „a very powerfull result" ...*
„pointing to the fact that the first case
Fermat's Theorem may very well be true." [1)]

Ribenboim devoted mathematical sonnet
„Krasner Versus Fermat"

to Krasner's works about Fermat's Problem
comparing them with a conquered fortresses that are charging the old warriors
which, already tired of their efforts give up and do not come to the goal.

„Not Krasner. Not knowing much of what was tried before,
Krasner followed a new and original path.
His note of 1934 is very ingenious and
contains a definite contribution to the first case." [2)]

Between 1934 and 1939 Krasner was occupied only with
p-adic numbers (*and* ***algebraic numbers***),

and as of 1939 with

general valued corps on a group of real valuations.

It was not until the early sixties that he developed a serious interest for Krull's valuations and non-commutative valuations.

Krasner extended
the Hilbert – Hasse theory of ramification of Galois extensions of p-adic fields
to the case of
non-normal finite extensions of p-adic fields.

In order to conveniently formulate the results,
Krasner made use of
the concept of a hypergroup.

He focused his attention
on primitive extensions of p-adic fields
and searched the conditions
for two Eisenstein equations to define the same extension.

The need to exactly understand the situation led to a study of
an ultrametric on space of polynomials
and the discovery of what Krasner called
*„****principe fondamental****", now known as* ***Krasner's lemma.***

The same paper contains
the arithmetical characterisations of meta-galoisian extensions
and, in germ, calculations which eventually led to

Krasner's most important result:
explicit formulas for number of extensions of p-adic field,
with
given degree and different.

The approximation of complete valued fields
of prime characteristic by fields of characteristic zero
as well as the work on
units of p-adic fields
belong also to the theory of p-adic fields.

Krasner's interest in
the foundations of mathematics and logic
did not come to the fore only
in ***Abstract Galois Theory****, which he built,*
but also in his so-called ***definability.***

„Generalizing Évariste Galois' ideas, which he considers as the essence of logic Krasner attributed
to logic and extended to infinitary languages.[3)]

Graduations are old, as well as new, says Krasner in his work
„Le vieux qui est noef". [4)]

The first relatively, but not enough, general definition of graded groups
limited on the Abelian graded group,
was given
by Bourbaki.

Krasner*,*
leaving aside his unnecessary restricted hypothesis of commutativity,
brings us to
Bourbaki-Krasner's definition.

In his monograph
„Anneaux gradues generaux"[5)]
Krasner shows
that the graded group is characterised by both
the underlying abstract group and the homogeneuos subset
(*or even only by the homogeneous subset*)
and introduces adequate notions of
graded rings *and* ***modules***
together with their homogeneous subsets called
„anneïdes" *and* ***„moduloïdes".***

The notion of graded homogeneuos field, called
„corpoïd"
was also introduced by Marc Krasner, but much earlier (*in 1940s*).

Marc Krasner with his pupils
developed:
i **)** *a homogeneous theory of commutative graded rings*
from the Noetherian point of view – Marcel Chadayras,[6)]
ii **)** *the homogeneous theory of generally non-commutative regular rings,*

from the Artinian point of view – Emanuel Halberstadt,[7] *and*
iii **)** *jointly with me introduced*
paragraded structures (groups, rings, modules)
developing thus the theory which generalizes the corresponding
Bourbaki-Krasner's graded structures
and has in each of the three cases:
groups, rings, and modules
the property of closure
with respect to the direct product and the direct sum
in the sense that the support of the homogeneous part of this product is
Cartesian restricted product, resp. Cartesian product of the homogeneous part
of components.
The characterisation axioms of paragraded groups give a way
to three study methods of this groups which are in principle equivalent:
non-homogeneous, semihomogeneous, and homogeneous.

To summarize and choose
from so many different scientific discussions and results,
and problems that Krasner pointed out,
as well as his other overall work
cannot be done by an individual,
but it should be done by a whole troupe of individuals
from different scientific fileds.

I'll finish **my Verse to Krasner** *with a dedication with which*
Alain Connes [8)]
began his work:

„To the memory of Marc Krasner
in recognition of his foresightedness."

Mirjana Vuković

---

1) **P. Ribenboim.,** *13 Lectures on Fermat's Last Theorem, Springer Verlag, New-York, 1979.*
2) **P. Ribenboim**.,*Krasner Versus Fermat, Elefteria (Athens) Sept. 1985, 108-115 and Queen's University,Ontario, Canada, 1985.*
3) **M. Guillaume,** *Revue d'histoire des sciences, Mathematical Logic in France between the Two World Wars, Vol. 62, 2009/1.*
4) **M. Krasner,** *Le vieux qui est noef, Revue Romaine de Mat pure et appliquées, T. XXVII, 443–472 .*
5) **M. Krasner,** *Anneaux gradués généraux, Colloque d'algèbre, Rennes (1980), p. 209–308.*
6) **M. Chadeyras,** *Essai d'une théorie noethérienne homogène pour les anneaux commutatifs dont la graduation est aussi générale que génpossible, Bull. Soc. math. France, Mémoire n° 22, 1970, 143 p.*
7) **E. Halberstadt**,*Théorie artinienne homogène des anneaux gradués non commutatifs a grades réguliers, Université „Pierre et Marie Curie" Paris, 1970*
8) **M. Krasner** & **M. Vuković,** *Structures paragraduées (groups, anneaux modules), Queen's paperss in pure and applied Mathe- Mamatics, Queen's Univesity, ONT. Canada, No. 77, (1987), 163 p.*
9) *Member of French Academy of Sciences and Recipient of Fields Medal.*

PROGRAMME

BOOK OF ABSTRACTS

BIOGRAPHIES

PROGRAMME

AKADEMIJA NAUKA I UMJETNOSTI BOSNE I HERCEGOVINE
ACADEMY OF SCIENCES AND ARTS OF BOSNIA AND HERZEGOVINA
АКАДЕМИЈА НАУКА И УМЈЕТНОСТИ БОСНЕ И ХЕРЦЕГОВИНЕ

Univerza v Mariboru
Fakulteta za naravoslovje in matematiko

INSTITUT FOURIER

International Scientific Conference
„GRADED STRUCTURES IN ALGEBRA AND THEIR APPLICATIONS"
dedicated to the memory of Professor Marc Krasner
22-24 September 2016
IUC Dubrovnik, Croatia
www.anubih.ba

PROGRAMME

1st DAY: Thursday, September 22, 2016

ARRIVAL OF LECTURERS
19:00 *Reception* at **International University Centre (IUC) Dubrovnik**

2nd DAY: Friday, September 23, 2016

8:30-9:00 **Registration of participants**

9:00-9:30 **Opening speeches (ANUBiH, IUC)**

9:30-9:50 **Prof. Dr. Mirjana Vuković, corresponding member of ANUBiH**
Academy of Sciences and Arts of Bosnia and Herzegovina; Department of Natural Sciences and Mathematics, Sarajevo, BA
"*About Professor Marc Krasner (1912-1985)*"

9:50-10:10 **Prof. Dr. Mirjana Vuković, corresponding member of ANUBiH, Assist. Prof. Dr. Emil Ilić-Georgijević**
Academy of Sciences and Arts of Bosnia and Herzegovina; Department of Natural Sciences and Mathematics, Sarajevo, BA
"*A note on radicals of paragraded rings*"

10:10-10:30 **Assist. Prof. Dr. Emil Ilić-Georgijević, Prof. Dr. Mirjana Vuković**
University of Sarajevo, Faculty of Civil Engineering, Sarajevo, BA
"*A note on general radicals of paragraded rings*"

10:30-11:00 **COFFEE BREAK**

11:00-11:20 **Prof. Dr. Vlastimil Dlab F.R.S.C.**
Carleton University, Ottawa, Ontario, CA
"*Towers of semisimple algebras, their graphs and Jones index*"

11:20-11:40 **Prof. Dr. Nadiya Gubareni**
Czestochowa University of Technology, Faculty of Mechanical Engineering and Computer Science, Częstochowa, PL
"*Tensor algebras and their representations*"

11:40-12:00 **Prof. Dr. Elena I. Bunina, Prof. Dr. Alexander V. Mikhalev**
Lomonosov Moscow State University, RU
"*Elementary Equivalence of Linear Groups over Graded Rings with Finite Number of Central Idempotents*"

12:00-12:20 **Prof. Dr. Dušan Pagon**
University of Maribor, Faculty of Natural Sciences and Mathematics, Maribor, SI
"*On codimension growth of graded PI-algebras*"

12:20-12:40 **Prof. Dr. Mirna Džamonja**
University of East Anglia, Norwich Research Park, Norwich, Norfolk, GB
"*Paragraded structures inspired by mathematical logic*"

12:40-14:00 **LUNCH**

14:00-14:20 **Academician Stevan Pilipović, et al.**
University of Novi Sad, Faculty of Sciences, Novi Sad, RS
"*Spaces of ultradistributions of Beurling type over R^d_+ through Laguerre expansion*"

14:20-14:40 **Prof. Dr. Alexei Pantchichkine**
University Joseph Fourier, Grenoble, FR
"*Graded structures and differential operators on nearly holomorphic and quasimodular forms on classical groups*"

14:40-15:00 **Prof. Dr. Siegfried Böcherer**
University of Mannheim, Institute of Mathematics, Mannheim, DE
"*Quasimodular Siegel modular forms as p-adic modular forms*"

15:00-15:10 **Prof. Dr. Alain Escassut**
University Blaise Pascal, Clairmont-Ferrand, FR
"*Works involving Marc Karsner and French mathematicians*"

15:10-15:30 **Prof. Dr. Alain Escassut, et al.**
University Blaise Pascal, Clairmont-Ferrand, FR
"*Order, type and cotype of growth for p-adic entire functions*"

15:30-16:00 **DISCUSSION and CLOSING REMARKS**

16:00-20:00 **FREE TIME FOR SIGHTSEEING**

20:00 **DINNER**

3rd DAY: Saturday, September 24, 2016

DEPARTURE OF LECTURERS

ABSTRACTS

A NOTE ON RADICALS OF PARAGRADED RINGS

Emil Ilić-Georgijević
Faculty of Civil Engineering, University of Sarajevo

Mirjana Vuković
Academy of Sciences and Arts of Bosnia and Herzegovina

Abstract

In this talk we present some results from the radical theory of paragraded rings, structures introduced by Krasner and Vuković [M. Krasner, M. Vuković, Queen's Papers, Ontario, 1987] (see also [M. Vuković, Institute Fourier, Grenoble, 2001]). We also examine properties of some concrete radicals, the Baer and the Jacobson radicals of a paragraded ring and their paragraded versions. In particular, we prove that the paragraded Baer radical of a paragraded ring coincides with the largest homogeneous ideal which is contained in the classical Baer radical of a paragraded ring. Similar results are obtained for the Jacobson radical but, following Halberstadt's results on graded rings, we also establish a relation between the paragraded Jacobson radical and the Jacobson radical of a ring which corresponds to an idempotent, under assumptions that the underlying paragraded ring is regular and that each element of its paragrading set is either idempotent or nilpotent of degree two with respect to minimal multiplication. Namely, under these assumptions, the Jacobson radical of a ring corresponding to a nonzero idempotent coincides with the intersection of the paragraded Jacobson radical of a paragraded ring and the aforementioned ring corresponding to an idempotent. Finally, some examples of paragraded rings which are also graded are known [M. Krasner, M. Vuković, Queen's Papers, Ontario, 1987], but here we present some examples of paragraded rings which are not graded.

Some references

[1] E. Halberstadt, Théorie artinienne homogène des anneaux gradués a grades non commutatifs réguliers, Ph.D. thesis, University Piere and Marie Curie, Paris, 1971.
[2] E. Ilić-Georgijević, M. Vuković, The Wedderburn–Artin Theorem for paragraded rings, Fundam. Prikl. Mat., 19 (6) (2014), 125–139.
[3] M. Krasner, M. Vuković, Structures paragraduées (groupes, anneaux, modules), Queen's Papers in Pure and Applied Mathematics, No. 77, Queen's University, Kingston, Ontario, Canada, 1987
[4] M. Vuković, Graded and paragraded structures, Preprint Joseph Fourier, 2001.
[5] M. Vuković, E. Ilić-Georgijević, Paragraded rings and their ideals, Fundam. Prikl. Mat., 17 (4) (2012), 83–93, J. Math. Sci., New York 191, No. 5 (2013), 654–660.

2010 *Mathematics Subject Classification:* 16W50, 16N20, 16N60, 16N80.
Key words and phrases: paragraded ring, radical and paragraded radical, Bear radical, Jacobson radical.

A NOTE ON GENERAL PARAGRADED RADICALS OF PARAGRADED RINGS

Emil Ilić-Georgijević
Faculty of Civil Engineering, University of Sarajevo

Mirjana Vuković
Academy of Sciences and Arts of Bosnia and Herzegovina

Abstract

In this talk we study the general paragraded radical theory of paragraded rings, structures introduced by Krasner and Vuković [M. Krasner, M. Vuković, Queen's Papers, Ontario, 1987] (see also [M. Vuković, Institute Fourier, Grenoble, 2001]). It is well known that the ADS-Theorem (Anderson – Divinski – Suliński Theorem) overcomes the problem of the relation "being an ideal" not being transitive for associative rings. We prove a version of the ADS-Theorem for associative paragraded rings, that is, we prove that for any paragraded radical α (in the sense of Kurosh and Amitsur) and any associative paragraded ring R, if I is a homogeneous ideal of R, then $\alpha(I)$ is a homogeneous ideal of R. Also, the characterization of a paragraded normal radical is given. We also study special paragraded radicals of paragraded rings. It is known that any special radical of a ring can be described by an appropriate class of modules over that ring [V.A. Andrunakievich, Y.A. Ryabuhin, Moscow, 1979]. Our aim is to show that all special paragraded radicals of paragraded rings can be described by an appropriate class of their paragraded modules. This is already done for graded rings [Balaba, Buletinul Academiei de Stiinte a Republicii Moldova. Matematica, 2004]. We define the general class of paragraded modules which satisfies certain properties and define the paragraded radical of a paragraded ring as the intersection of annihilators of paragraded modules over that ring which belongs to the general class. The class of special paragraded radicals of paragraded rings is defined and it is proved that the largest special class of paragraded rings coincides with the class of all paragraded prime rings. If we observe a class which is a subclass of the special class of paragraded irreducible modules, then we prove that the corresponding paragraded radical coincides with the largest homogeneous ideal contained in the corresponding classical radical.

Some references

[1] E. Ilić-Georgijević, M. Vuković, The Wedderburn–Artin Theorem for paragraded rings, Fundam. Prikl. Mat., 19 (6) (2014), 125–139.
[2] M. Krasner, M. Vuković, Structures paragraduées (groupes, anneaux, modules), Queen's Papers in Pure and Applied Mathematics, No. 77, Queen's University, Kingston, Ontario, Canada 1987.
[3] M. Vuković, E. Ilić-Georgijević, Paragraded rings and their ideals, Fundam. Prikl. Mat., 17 (4) (2012), 83–93, J. Math. Sci., New York 191, No. 5 (2013), 654–660.

2010 *Mathematics Subject Classification:* 16W50, 16N80.
Key words and phrases: paragraded rings and modules, special and normal paragraded radical.

TOWERS OF SEMISIMPLE ALGEBRAS, THEIR GRAPHS AND JONES INDEX

Vlastimil Dlab
Carleton University, Ottawa, Canada

Abstract: A pair of finite dimensional semisimple algebras $A \subseteq B$ defines recursively (using the Jones fundamental construction of [J]) a tower of algebras

$$A_0 \subseteq A_1 \subseteq \ldots \subseteq A_t \subseteq A_{t+1} \subseteq A_{t+2} \subseteq \ldots ,$$

where $A_0 = A$, $A_1 = B$ and $A_{t+2} = \mathrm{End}(A_{t+1})_{A_t}$ for $t \geq 1$.

Such towers and their inductive limits have been objects of study in the theory of C^* algebras, and the respective methods and results were well recorded in [GHJ]. In particular, the Jones index $[B:A]$ of A in B defines the growth rate

$$[B:A] = \limsup_{t\to\infty} [rank(A_t \mid A_0)]^{\frac{1}{t}}.$$

Based on [DR1] the paper [DR2] revealed that a significant part of the theory is purely algebraic, showed close connections to the study of graded hereditary algebras and pointed out, in particular, the way the Jones index $[B:A]$ is related to the eigenvalues of the Coxeter transformation defined by the respective valued graph. This provided an explanation of the "mysteries" of the "discrete" values of $[B:A] = 4cos^2 \frac{\pi}{n}$ *for* $n \geq 3$ [the case of Dynkin graphs – finite representation type] and the value $[B:A] = 4$ [the case of extended Dynkin graphs – tame representation type]. In all other cases [wild representation type]

$$[B:A] \geq \rho^*, \text{ where } \rho^* = \lambda^* + 2 + \frac{1}{\lambda^*}$$

with the largest root λ^* of the equation

$$x^{n+1} = x^{n-1} + x^{n-2} + \cdots + x + 1.$$

Exploiting these ideas, the set of the values of $[B:A]$ can be described. In particular, the Jones index can attain any real value

$$r \geq \bar{\rho} = 2 + \sqrt{5} = 4.2360\ldots = \lim_{n\to\infty} \rho_n, \text{ where } \rho_n = \lambda_n + 2 + \frac{1}{\lambda_n}$$

with the largest root λ_n of the equation

$$x^{n+1} = x^{n-1} + x^{n-2} + \cdots + x + 1,$$

is the Jones index $[B:A]$ of a suitable pair.

References

[DR1] V. Dlab and C. M. Ringel, Indecomposable representations of graphs and algebras, Mem. Amer. Math. Soc. 173 (1976).

[DR2] V. Dlab and C. M. Ringel, Towers of semi-simple algebras, J. Funct. Anal. 102 (1991), 35-46.

[GHJ] F. M. Goodman, P. de la Harpe and V. F. R. Jones, Coxeter graphs and towers of algebras, Springer-Verlag, Berlin – New York, 1989.

[J] V.F.R. Jones, Index for subfactors, Invent. Math. 72(1983), 1 – 25.

2010 *Mathematics Subject Classification:* 16G20, 16G60, 46L35.
Key words and phrases: Pairs of semisimple algebras, towers of semisimple algebras, Jones index

TENSOR ALGEBRAS AND THEIR REPRESENTATIONS

Nadiya Gubareni
Institute of Mathematics, Częstochowa University of Technology
Częstochowa, Poland

Abstract

This talk presents the results in the representation theory of some kind of species which are generalizations of species as introduced by P. Gabriel in 1972. Quivers and species play a key role in the representation theory of associative algebras and rings. First K-species of finite representation type in a special case were characterized by P. Gabrial. Later his result was extended by V. Dlab and C. M. Ringel to the case of an arbitrary K-species and valued quivers. We consider (D,O)-species which are a particular example of general species as introduced by Yu. A. Drozd in 1980. They are closely connected with tensor algebras of bimodules $T_B(V)$, where B is a direct sum of prime hereditary Noetherian semiperfect rings and V is a (B,B)-bimodule. The representations of (D,O)-species and corresponding tensor algebras of bimodules are considered.

Matrix problems, i.e. the problems of reducing a family of matrices by some family of admissible transformations, arise in many problems of representation theory. The general definition of a matrix problem over a field was first given by A. V. Roiter and then this definition was generalized by Yu. A. Drozd to the case of a ring. We show in what way one can reduce the representations of (D,O)-species to some flat mixed matrix problems over discrete valuation rings and their skew fields of fractions and consider some of such main matrix problems.

Following to R. B. Warfield, Jr. a ring A is of bounded representation type if there is an upper bound on the number of generators required for indecomposable finitely presented right A-modules. We study (D,O)-species of bounded representation type and give the classification theorem of such (D,O)-species in terms of diagrams which are similar to Dynkin diagrams.

The connection of special kinds of (D,O)-species and corresponding tensor algebras with right hereditary semiperfect and semidistributive rings is considered. We describe right hereditary semiperfect and semidistributive rings of bounded representation type.

2010 *Mathematics Subject Classification:* 16G20, 16G60, 16P40, 16D70, 16D90.
Key words and phrases: tensor algebra of a bimodule, species, (D,O)-species, hereditary rings, semiperfect rings, semidistributive rings, species of bounded representation type, rings of bounded representation type, mixed matrix problems, discrete valuation rings.

ELEMENTARY EQUIVALENCE OF LINEAR GROUPS OVER GRADED RINGS WITH FINITE NUMBER OF CENTRAL IDEMPOTENTS

Elena I. Bunina

Alexander V. Mikhalev
M. V. Lomonosov Moscow State University, High Algebra Department
Moscow, Russia

Abstract

In this talk we prove the criterion of elementary equivalence of linear groups over graded rings with finite number of central idempotents from the 0-component, when grading is partially included in the group language.

The main result of this paper is the following theorem:

Theorem. *Let G be a commutative group*,

$$R = \oplus_{g\in G} R_g, \qquad S = \oplus_{g\in G} S_g$$

be associative graded rings with 1, $M_n(R)$, $M_m(S)$ *be the corresponding graded matrix rings,* $n \geq 4$, $m \geq 4$. *Suppose that also both rings* R, S *contain only finite number of central idempotents from the components* R_0 *and* S_0, *respectively.*

Then elementary equivalence of the groups $GL_n(R)$ *and* $GL_m(S)$ *in the language respecting grading is equivalent to the existence of central idempotents* e *and* f *of the rings* $M_n(R)$ *and* $M_m(S)$ *respectively,* $e \in M_n(R)_0$, $f \in M_m(S)_0$, *such that*

$$e\,M_n(R) \equiv_{gr} f\,M_m(S), \qquad (1-e)\,M_n(R) \equiv_{gr} (1-f)\,M_m(S)^{op}$$

as graded rings.

2010 *Mathematics Subject Classification:* 03C68, 20H25.
Key words and phrases: linear groups, automorphisms, elementary equivalence, Chevalley groups, graded rings.

ON CODIMENSION GROWTH OF GRADED PI-ALGEBRAS

Dušan Pagon
University of Maribor, Department of Mathematics and Computer Sciences
Maribor, Slovenia

Abstract

Color Lie superalgebras are a natural graded generalisation of Lie algebras and Lie superalgebras which play an important role in various areas of mathematics and physics. We study some numerical invariants of polynomial identities of finite dimensional simple color Lie superalgebras over an algebraically closed field of characteristic 0.

Two finite dimensional simple Lie algebras over an algebraically closed field are isomorphic if and only if they satisfy the same polynomial identities (A. Koshkulei, Y. Razmyslov, 1983). As an alternative approach to the characterization of finite dimensional simple Lie algebras by their identities, some numerical invariants of the algebra identities can be used. We associate with a finite dimensional Lie algebra L a sequence of integers $c_n(L)$, called the n-th codimensions of L. It appears that $c_n(L) \leq (\dim L)^{n+1}$ and these quantities grow asymptotically like k^n, for some nonnegative integer k less than $\dim L + 1$ (A. Giambruno, M. Zaicev, 1999). Moreover, $k = \dim L$ if and only if the algebra L is simple.

We build a family of simple color Lie superalgebras $\{ L_b = F[V_4] \times Q \}$ with the following property. For each algebra L_b there exist a positive constant M and an integer k such that for all positive integers n the inequality $Mn^k (\dim L_b)^n \leq c_n(L_b)$ holds. This lower bound of codimension growth is a key to the proof of the existence of the so called PI-exponent for such simple color Lie algebras. As all algebras L from the above family are V_4 - graded, it also makes sense to study only their graded identities.

Theorem. Let F be an algebraically closed field of characteristic 0 and $L_b = F[V_4] \times Q$ be a color Lie superalgebra, where Q is a finite dimensional simple Lie algebra (with a trivial grading) over F and b is an arbitrary skew-symmetric bicharacter. Then the graded PI-exponent of algebra L_b exists and equals $4 \dim L_b$.

2010 *Mathematics Subject Classification:* 17B70, 16R10, 17C20, 17A30.
Key words and phrases: graded algebra, bicharacter, color Lie superalgebra, simple algebra, polynomial identity, *n*-th codimension, graded PI-exponent

PARAGRADED STRUCTURES INSPIRED BY MATHEMATICAL LOGIC

Mirna Džamonja
University of East Anglia
Norwich, United Kingdom

Abstract

A graded structure in algebra, for example a group or a vector space, is given by a filtration of the structure into an infinite direct sum using the integers, the natural numbers or a cyclic group as a support. This kind of filtration is very useful but it is not preserved by products. In their joint works (1986-1987) Krasner and Vuković introduced a generalisation of the concept of graduation into paragraduation. The main difference is that the index set of the filtration is now allowed to have an arbitrary order as a support, and, as long as certain axioms are respected, this construction preserves the Cartesian product.

In our talk we shall see how this concept has naturally arisen in the context of model theory and set theory, where the target structure is any first order theory and the underlying order is an ordinal. This kind of filtrations can be used to give natural invariants to structures, which in turn have been used to show that certain classes do not have an universal element under embedding. (The first use of the method goes to Kojman and Shelah in 1994 and the more recent one to the work of Džamonja in 2014). The contribution of this talk is to realise that these results, discovered in a completely different subject of mathematics, can be seen as an instance of the Krasner-Vuković paragraduation.

The paper associated with the talk discusses some other subjects as well, notably the notion of essentially same/different paragraduations which explores the situatuion when two paragraduations give the same limiting structure. It also studies the difference between a graduation and a paragraduation by showing that one paragraded structure, which has no natural graduation, can have many graded substructures, to the point that their number is not even decidable in ZFC.

2010 *Mathematics Subject Classification:* 08A99, 03C98.
Key words and phrases: Paragraduated structures, elementary chains, bi-emeddability.

SPACES OF ULTRADISTRIBUTIONS OF BEURLING TYPE OVER R_+^d THROUGH LAGUERRE EXPANSIONS

Smiljana Jakšić
Faculty of Forestry, University of Belgrade,
Belgrade, Serbia

Stevan Pilipović
Department of Mathematics, University of Novi Sad,
Novi Sad, Serbia

Bojan Prangoski
Faculty of Mechanical Engineering, University St. Cyril and Methodius
Skopje, Macedonia

Abstract

In this paper we define the spaces of ultradistributions of Beurling type over R_+^d and their dual spaces. Characterization of the spaces is given by the Laguerre series expansions and the growth rate of the corresponding Fourier-Laguerre coefficients. As a consequence of these characterizations, we obtain a deep insight into their topological structure and we prove the Schwartz kernel theorems.

2010 *Mathematics Subject Classification*46F12, 46F05, 33C45, 42B10, 44A15, 47G10, 47G30, 35S05.
Key words and phrases: Spaces of ultradistributions of Beurling type over R_+^d, Laguerre series expansions, Schwartz kernel theorem

GRADED STRUCTURES AND DIFFERENTIAL OPERATORS ON NEARLY HOLOMORPHIC AND QUASI-MODULAR FORMS ON CLASSICAL GROUPS

Alexei Pantchichkine
Institute Fourier, University Grenoble Alpes
Gières, France

Abstract

We wish to use graded structures studied by [M. Krasner, Rennes, 1980], [M. Krasner, M. Vuković, Queen's Papers, Ontario, 1987], and [M. Vuković, Institut Fourier, Grenoble, 2001] on differential operators and quasi-modular forms on classical groups and show that these structures provide a tool to construct *p*-adic measures and *p*-adic *L*-functions on the corresponding non-archimedean weight spaces.

An approach to constructions of automorphic *L*-functions on unitary groups and their *p*-adic analogues is presented. For an algebraic group *G* over a number field *K* these *L* functions are certain Euler products $L(s, f, r, \chi)$. In particular, our constructions cover the *L*-functions in the book by *G.* Shimura, [AMS, 2000] via the doubling method of Boecherer, Garrett, Piatetski-Shapiro and Rallis.

A *p*-adic analogue of $L(s, f, r, \chi)$ is a *p*-adic analytic function $L_p(s, f, r, \chi)$ of *p*-adic arguments s in Zp, χ mod p^r which interpolates algebraic numbers defined through the normalized critical values $L(s, f, r, \chi)$ of the corresponding complex analytic *L*-function.

We present a method using arithmetic nearly-holomorphic forms and general quasi-modular forms, related to algebraic automorphic forms.

It gives a technique of constructing *p*-adic zeta-functions via general quasi-modular forms and their Fourier coefficients.

2010 *Mathematics Subject Classification:* 11F67, 11F85, 11F33, 14G20, 22E50, 16W50, 16E45.
Key words and phrases: graded structures, automorphic forms, classical groups, *p*-adic *L*-functions, differential operators, non-archimedean weight spaces, quasi-modular forms, Fourier coefficients.

QUASIMODULAR SIEGEL MODULAR FORMS AS *p*-ADIC MODULAR FORMS

Siegfried Böcherer
Institute of Mathematics, University of Mannheim
Mannheim, Germany

Abstract

There is a sophisticated theory of nearly holomorphic Siegel modular forms by Shimura. Using previous results by Nagaoka and myself on Rankin-Cohen operators and theta-operators we will present a proof that quasimodular forms (defined as constant terms or as holomorphic part of a nearly holomorphic Siegel modular form) are always *p*-adic.

2010 *Mathematics Subject Classification:* 11F33, 11F46, 11F60.
Key words and phrases: Siegel modular forms, quasimodular forms, differential operators, Rankin-Cohen brackets, *p*-adic modular forms

ORDER, TYPE AND COTYPE OF GROWTH FOR *p*-ADIC ENTIRE FUNCTIONS

Alain Escassut

Kamal Boussaf

Abdelbaki Boutabaa

Department of Mathematics, University Blaise Pascal
Aubiere, France

Abstract

Let K be a complete ultrametric algebraically closed field and let A(K) be the K-algebra of entire functions on K. For an $f \in$ A(K), similarly to complex analysis, one can define the order of growth as $\rho(f) = \limsup_{r\to+\infty} \frac{\log(\log(|f|(r)))}{\log r}$. When $\rho(f) \neq 0, +\infty,$ one can define the type of growth as $\delta(f) = \limsup_{r\to+\infty} \frac{\log(|f|(r))}{r^{\rho(f)}}$. But here, we can also define the cotype of growth as $\psi(f) = \limsup_{r\to+\infty} \frac{q(f,r)}{r^{\rho(f)}}$ where $q(f,r)$ is the number of zeros of f in the disk of center 0 and radius *r*. Many properties described here were first given in the Houston Journal, but new inequalities linking the order, type and cotype are given in this paper: we show that $\rho(f)\sigma(f) \leq \psi(f) \leq e\rho(f)\sigma(f)$. Moreover, if ψ or σ is a veritable limit, then $\rho(f)\sigma(f) = \psi(f)$ and this relation is conjectured in the general case. Many other properties are examined concerning ρ, σ, ψ for f and f'. Particularly, we show that if an entire function f has finite order, than $\frac{f'}{f^2}$ takes every value infinitely many times.

2010 *Mathematics Subject Classification:* 12J25, 30D35, 30G06, 46S10.
Key words and phrases: p-adic entire functions, growth of entire functions, order, type and cotype of growth, branched values of meromorphic functions.

BIOGRAPHIES

Prof. Dr. SIEGFRIED BÖCHERER

Institute of Mathematics
University of Mannheim
Mannheim, Germany
e-mail: boecherer@math.uni-mannheim.de

Professor Siegfried Böcherer was born in 1952. After high school he was a student of mathematics at the University of Freiburg, where he got his diploma, Ph.D. and habilitation as an assistant of Professor Helmut Klingen. After guest positions in Göttingen, Tokyo, College Park (Maryland) and Hamburg, in 1990 he became a professor at Mannheim University where he stayed ever since.

He held research positions or was a long term visitor in Grenoble, MSRI Berkeley, IAS Princeton, Harish Candra Institute Allahabad, Fields Institute Toronto, Tata Institute Mumbai and Tokyo (Rikkyo, Todai and Waseda).

Many of his papers use the pullback formula of Eisenstein series (as created by P. Garrett) as a main tool.

His main scientific interest is the theory of Siegel modular forms, in particular its number theoretic aspects: relations to quadratic forms (theta series), Hecke operators, analytic and arithmetic properties of L-series, critical values of p-adic modular forms, congruence primes, equivariant differential operators, properties of Eisenstein series.

He considers H. Klingen, M. Eichler, E. Freitag, A. Andrianov, G. Shimura as his main academic teachers (by direct personal contact and/or their written work).

Prof. Dr. ELENA I. BUNINA

Moscow State University – Lomonosov
High Algebra Department and
Yandex School of Data Analysis
Moscow, Russia
e-mail: helenbunina@gmail.com

Professor Elena I. Bunina was born in 1976 in Moscow, Russia. She started her study in 1993 at the Department of Mathematics and Mechanics of Moscow State University – Lomonosov and at the Mathematical College of Independent Moscow University. In 1995 she also entered the Faculty of Algebra.

In 1998 she graduated from the Moscow State University with the Gold Medal and Master thesis *Elementary equivalence of unitary linear groups* (supervisor: Prof. A.V. Mikhalev), as well as from the Independent Moscow University, Mathematical College.

She studied and worked at Moscow State University – Lomonosov:

- 1998-2001 - Ph.D. study at the Department of Algebra which she finished in 2001 with Ph.D. thesis *Elementary equivalence of linear and algebraic groups* (under supervision of Professor Alexander Vasilevich Mikhalev);
- 2001-2006 - Assistant researcher at the Moscow State University, Laboratory for Computational Methods, Faculty of Mechanics and Mathematics;
- 2006-2011 - researcher at the Department of High Algebra of the Faculty of Mechanics and Mathematics of Moscow State University;
- 2010 - acquired Doctoral Degree with thesis *Automorphisms and elementary equivalence of Chevalley groups and other derivative structures* (under the supervision of Professor Alexander Vasilevich Mikhalev);
- 2011 to present - professor at the Department of High Algebra of the Faculty of Mechanics and Mathematics of the Moscow State University;
- 2007 to present - Director of the Yandex School of Data Analysis (Magister program in Computer Science).

Her major research interests are the following mathematical domains**:** Linear Algebra, Linear Groups, Chevalley Groups**,** Theory**,** Ring Theory, Mathematical Logic, Foundation of Mathematics**,** General Algebraic Systems**,** Groups, Semigroups.

Prof. Dr. VLASTIMIL DLAB, F.R.S.C

Distinguished Researcher and
Professor Emeritus
School of Mathematics and Statistics
Carleton University
Ottawa, Canada
e-mail: vlastimil73@hotmail.com

Professor Vlastimil Dlab was born in 1932 in the North-Bohemian village of Bzi, Czechoslovakia. In 1956 he graduated from the Charles University in Prague (RNDr.). There he started his mathematical career in algebra and received CSc. (Candidate of Science) in 1959, and DSc. (Doctor of Science) in 1966.

For several years, he held a position at the University of Khartum. In 1965 he was invited to the Institute for Advanced Studies in Canberra where he stayed for three years. Returning from Australia to the Charles University where he was to be appointed Professor, the political situation in Czechoslovakia led him to accept an offer from Carleton University in Ottawa, Canada. He has been working there ever since, with numerous stays at other research centers and universities all around the world.

He has been associated with Carleton University, as professor of mathematics, as Department chair (1971-74 and 1994-1997), director of Ottawa-Carleton Institute of Mathematics and Statistics (1992-94). He served as Chairman of the Research Committee of the Canadian Mathematical Society (1973-77). In 1977, he was elected a Fellow of the Royal Society of Canada (Academy of Science). He is a Professor Hospitus of the Normal University in Beijing and Charles University in Prague.

Prof. Dlab is a specialist on modern algebra. He has written over 130 research papers, number of papers on education of mathematics and 4 books.

He was Editor-in-Chief of *Canadian Journal of Mathematics* (1988-94) and *Comptes Rendus – Mathematical Report of Academy of Science,* Member of the Editorial Board of: *Communications in Algebra, Algebras and Representation Theory* (1997 – present), *Algebra and Discrete Mathematics* (2002 – present).

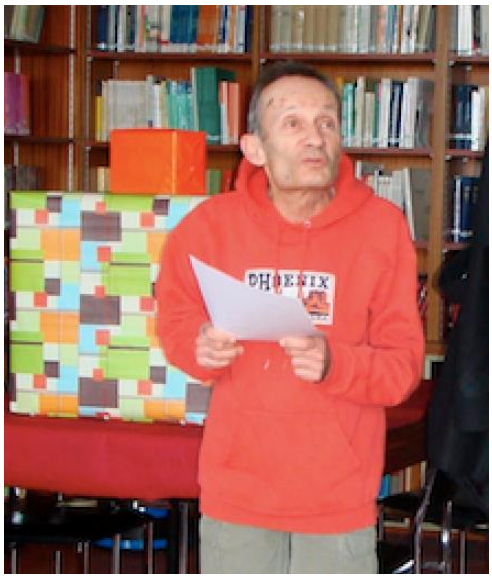
Prof. Dr. MIRNA DŽAMONJA

University of East Anglia
Norwich, United Kingdom
e-mail: M.Dzamonja@uea.ac.uk;
mirnazemlji@me.com

Professor Mirna Džamonja was born in 1965 in Sarajevo. She now shares her time between England, as a Professor of Mathematics at the University of East Anglia, Norwich (UEA) and France, as an Associate Member of the Institute for the Philosophy of Sciences and Technology (IHPST), Université Panthéon-Sorbonne, Paris 1. She specialises in mathematical logic, especially set theory and its connections with other subjects of mathematics and computer sciences, as well as the philosophy of mathematics and foundations of mathematics and computer sciences.

Mirna Džamonja got her B.Sc. in Mathematics at the University of Sarajevo in 1988 with Golden badge. She continued her studies in the Department of Mathematics at the University of Wisconsin-Madison, USA (UW-Madison), with an M.A. in 1990 and Ph.D. in 1993 (with Kenneth Kunen). She went on a two year postdoc at the Hebrew University of Jerusalem, Israel, with Saharon Shelah and Menachem Magidor. Then she taught for three years at UW-Madison, to finally move to UEA in 1998. She was elected Professor of Pure Mathematics at UEA in 2010 and in 2015 she was named Associate Member of IHPST. Over the years she was an Invited Professor at CUNY (New York), UW-Madison, Université Paris VII and K. Goedel Center in Vienna.

Professor Džamonja's work includes papers in set theory, model theory, combinatorics, measure theory, theory of order, Banach spaces, topology and functional analysis, as well as computer sciences and philosophy. She is a leader on the questions of universality and combinatorial principles and an important contributor to the theory of singular cardinals. She proved the consistency of the existence of a universal uniform Eberlein compact with the negation of GCH, answering a question in functional analysis which was open for almost 30 years, and she developed the theory of forcing at the successor of singulars. She obtained a Forchheimer Fellowship (Israel, 1994) and an EPSRC Advanced Fellowship (UK, 2002). She served as the Chair for the Association's for Symbolic Logic Committee for Logic in Europe, President of the European Set Theory Society, editor in numerous journals, including Sarajevo Journal of Mathematics, and member of the EPSRC Peer Review College. She has had twelve Ph.D. students and many Masters' students.



Prof. dr. ALAIN ESCASSUT

Department of Mathematics
University Blaise Pascal
Aubiere, France
e-mail: alain.escassut@math.univ-bpclermont.fr

Professor Alain Escassut was born in 1943, in France. He studied at the University of Bordeaux. He achieved his Ph.D., in 1970, supervised by Jean Fresnel, on algebras H(D) of analytic elements on an ultrametric complete algebraically closed field K defined by Marc Krasner and showed that most of algebraic properties are linked to T-filters on the set D, like the problem of analyticity.

Working as Maître-Assistant or Maître de Conference at the University of Bordeaux, he then examined the link between algebras defined by J. Tate, called affinoid algebras and algebras of analytic elements H(D): they were called Krasner-Tate algebras; they are very simple algebras, among the set of Krasner algebras H(D). That was his These de Doctorat d' Etat.

Following works by Bernard Guennebaud, he then examined the continuous semi-multiplicative seminorms of Banach algebras on a complete ultrametric field. Particularly, for Krasner algebras H(D), they are characterized by circular filters. That study led him to many results of ultrametric holomorphic calculus, particularly regarding idempotents and the spectral semi-norm. It is also the basis of all Berkovich theory.

Appointed Professor at the University Blaise Pascal of Clermont-Ferrand in 1987, he examined applications of the ultrametric Nevanlinna Theory in joint works with A. Boutabaa, defining the affinely rigid sets that were proven to be the Unique Range Sets for polynomials (with L. Haddad, A. Boutabaa) and finally Unique Range Sets for all entire functions in the ultrametric field, a generalization by W. Cherry and C. C. Yang.

An ultrametric version of the Kakutani problem (Corona problem) was examined. Several successive solutions were given, (certain with Nicolas Mainetti). The final solution was given in 2015 for proving the density of the "open unit disk" inside the set of all continuous multiplicative semi-norms whose kernel is a maximal ideal.

Applications of the *p*-adic Nevanlinna Theory were given to meromorphic functions: branched functions, small functions, exceptional values (with K. Boussaf, J Ojeda, and J-P. Bézivin).

Professor Alain Escassut advised three Students in Ph.D. and four Habilitations. His books published with WSCP: Analyic Elements in *p*-adic Analysis, Ultrametric banach Algebras, Value Distribution in p-adic Analysis.

Prof. Dr. NADIYA GUBARENI

Czestochowa University of Technology
Faculty of Mechanical Engineering and Computer Science
Częstochowa, Poland
e-mail: nadiya.gubareni@yahoo.com

Education:

1973: M.Sc. in Mathematics, Kiev State University, Department of Mechanics and Mathematics, Kiev, Ukraine

1979: Ph.D., Kiev State University, Department of Mechanics and Mathematics, Kiev, Ukraine (Thesis: *Structure of semiperfect right hereditary and right Noetherian rings of bounded representation type*)

1998: D.Sc. (habilitation), Institute of Modeling Problems in Energy, Ukrainian Academy of Science, Kiev, Ukraine (Thesis: *Elaboration of computational methods, algorithms and structures for solving the problems of computer tomography with limited number of projection data*)

Professional experience:

1999 – present Professor, Częstochowa University of Technology, Poland

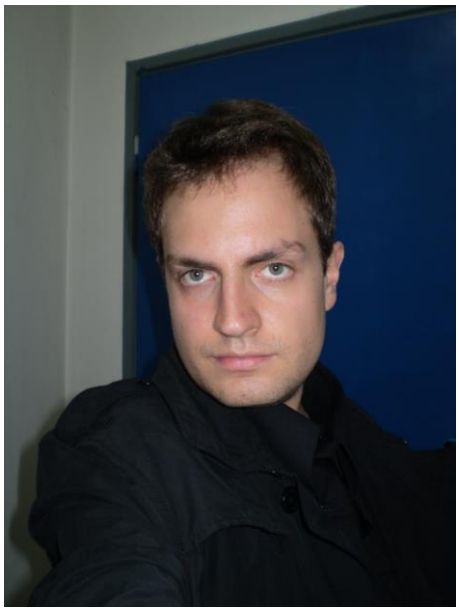
1995 – 1999 Associate Professor, Częstochowa University of Technology, Poland

1973 – 1995 Senior Researcher, Leading Researcher, Institute of Modeling Problems in Energy, Ukrainian Academy of Science, Kiev, Ukraine

Research interests: Theory of non-commutative algebras, rings and modules over them; Mathematical methods and algorithms in computer tomography; Asynchronous methods and parallel algorithms.

Publications: Author and coauthor of about 80 articles, proceedings, book chapters, books and monographs, including:

- Michiel Hazewinkel, Nadiya Gubareni, *Algebras, Rings and Modules*: *Non-commutative Algebras and Rings*, CRC Press, 2016, xiv+374p.
- Michiel Hazewinkel, Nadiya Gubareni, V.V.Kirichenko, *Algebras, Rings and Modules*: *Lie Algebras and Hopf Algebras*, Mathematical Surveys and Monographs, vol.168, AMS, Providence, 2010, xii+411p.
- Michiel Hazewinkel, Nadiya Gubareni, V.V.Kirichenko, *Algebras, Rings and Modules*, vol.II, Springer, 2007, xii+400p.
- Michiel Hazewinkel, Nadiya Gubareni, V.V.Kirichenko, *Algebras, Rings and Modules*, vol. I, Kluwer Academic Publishers, 2004, xii+380p.
- N.M.Gubareni, *Computational methods and algorithms of computer tomography with limited number of projection data,* Kiev, Naukowa Dumka, 1997, 328p. (in Russian)



Assist. Prof. Dr. EMIL ILIĆ-GEORGIJEVIĆ

Faculty of Civil Engineering
University of Sarajevo,
Sarajevo, Bosnia and Herzegovina
e-mail: emil.ilic.georgijevic@gmail.com

Assistant Professor Emil Ilić-Georgijević was born in Sarajevo, on July 28, 1983. In 2002, after graduating from the Grammar School *Third Gymnasium* in Sarajevo with the Pupil of the generation award, he became a student of the Department of Mathematics of the Faculty of Mathematics and Natural Sciences at the University of Sarajevo. In 2006, he graduated with average mark 10, which earned him a title of the most successful student of the generation at the University of Sarajevo along with the Golden Badge of the University of Sarajevo. In the same year, he became a postgraduate student of the Department of Mathematics and Informatics of the Faculty of Philosophy at the University of East Sarajevo, where he defended his Master and Ph.D. thesis in 2009 and 2011, respectively, under the supervision of Professor Mirjana Vuković, in the area of paragraded structures, structures that are introduced by Marc Krasner and Mirjana Vuković. His main research interest is in the field of associative rings with additional structure, and particularly in graded and paragraded rings. Since 2006 he has been working at the Faculty of Civil Engineering of the University of Sarajevo, starting as a Teaching Assistant and since 2012 as an Assistant Professor.

Prof. Dr. ALEXANDER V. MIKHALEV

Moscow State University – Lomonosov
High Algebra Department
Moscow, Russia

Professor Alexander Vasilevich Mikhalev was born in 1940 in Briansk, Russia. He graduated from the Faculty of Mechanics and Mathematics of Moscow State University – Lomonosov (1961) in domain of mathematics. There he completed his Candidate's thesis in 1967 and his: Doctor's thesis in 1990. He is professor at the Higher Algebra Department and Head of the Computational Methods Laboratory at the Faculty of Mechanics and Mathematics. He was Pro-Rector of the University.

Alexander Mikhalev has been working at Moskow State University – Lomonosov for more than 40 years. He is the author of more than 250 publications, including 9 monograph and 10 textbooks. He has delivered many fundamental courses of lectures.

He has been a research supervisor to 100 seekers of Candidate and Doctor Degree. He worked with many students and professors from around the world.

He has solved many open problems, as well: *the Bair – Koplansky problem; the Schreier - Van-der Varden problem* (*together with I.Z. Golubchik*) and *the Herstein's problem* (*together with K.I. Beidar, W. Martindale*). *Together with V. K. Zakharov he has solved the problem of Riss – Padon as well as the Maltsev problem of elementary equivalence of linear and algebraic groups* (*with K.I. Beidar and E.I. Bunina*).

He is (or was) member of the Editorial boards of many journals, such as: I. G. Petrovsky Seminar Works, Abel's Groups and Modules, Fundamental and Applied Mathematics, South-east Asian Bulletin of Mathematics, Journal of Egyptian Mathematical Society.

A. Mikhalev is a recipient of the *Premium of the USSR Council of Ministers for Applied Research* (1982), full member of *the International High School Academy* (1996) and *the Russian Academy of Natural Sciences* (2002). In 2003 he was entitled the *Honorary Scholar of Russian Federation*.

Prof. Dr. DUŠAN PAGON

University of Maribor
Faculty of Natural Sciences and Mathematics
Maribor, Slovenia
e-mail: dusan.pagon@uni-mb.si

Professor Dušan Pagon was born on the 18th of July 1955 in Ljubljana. In 1973 he obtained his secondary education at Gimnazija Jurija Vege in Idrija. He studied pure mathematics at the Moscow State University M. V. Lomonosov in the years 1974-1982, when he defended his Ph.D. thesis entitled *Deformations of graded Lie algebras* under the supervision of the corresponding member of the Russian Academy of sciences, professor Aleksei I. Kostrikin. Since then he works in Slovenia as researcher and university teacher.

During the years 1984-1985 Dušan Pagon worked on research projects at the Institut Jozef Stefan in Ljubljana. Since then he gives courses on different topics from the algebra and geometry areas at the Department of Mathematics and Computer Science of the University of Maribor. For the last 10 years he is in the position of a full-time professor. Occasionally, he also teaches abroad; in the summer-fall of the 1999/2000 academic year he was a visiting professor at MSU M. V. Lomonosov. About 120 students graduated under his supervision.

By now professor Pagon published 3 monographs, about 40 scientific articles and presented the results of his research work at several international conferences and different universities in many European countries, Brazil, Canada, India, Israel, Japan and USA. He also participated in many international research projects. In the years 1992-1997 he was a coordinator of the Tempus JEP/JEN-4315 project *The improvement of mathematics education in secondary schools* with seven participating universities from the Czech Republic, Germany, Slovenia, Spain and Great Britain. At the moment he is completing the work in the frame of the 4-years lasting FP-7 IRSES project *Dynamical systems and their applications* with 18 European, Belarus, Brazilian and Chinese partner universities.

Prof. Dr. ALEXEI PANTCHICHKINE

Institute Fourier
University Grenoble Alpes
Gières, France
e-mail: Alexei.Pantchichkine@ujf-grenoble.fr

Professor Alexei Pantchishkine was born in 1953 in Ordzhonikidze, USSR (Russia). He finished High School in Moscow region with Golden Medal (1971) and got his Diploma in Mathematics (1976) as well as all diplomas and degrees at the Department of Mathematics of the Moscow State University: Ph.D. in 1979 (under the direction of Prof. Yu. I. Manin) and Habilitation in 1990. He was an Assistant professor (1979-87) and an Associate professor (1987-1992) there. Since 1992 he is Full professor of the University of Grenoble Alpes, promoted to the Exceptional Class Full Professor in 2011.

He was visiting researcher and professor at many prestigious universities and institutes: University of Oxford, UK (1984-1985),), Japan University of Sapporo (JSPS-CNRS) (1994-1995). He was also in the membership of the Institute of Advanced Study, Princeton, USA (1999-2000).

Since 1989 he had a number of extended research stays at German universities in Goettingen, Bielefeld, Heidelberg, Mannheim, Max-Planck-Institute in Bonn, and in Italy - University of Padova and China - Tongji University in Shanghai.

He was co-organizer of many workshops and conferences, including "*Workshop p-adic analysis*" (Institute for Advanced Study in Mathematics, Hanoi, Vietnam), "*Modular Forms Workshop*" (University of Hawaii at Manoa (USA) with Simons foundation (AMS), 28th Journées Arithmétiques (Grenoble, France).

His principal domain of research is the algebraic number theory, with a special reference to the arithmetic of automorphic forms and the theory of complex and *p*-adic zeta functions. He is the founder of new mathematical directions: *Arithmetic of automorphic p-adic L-functions*, *Algorithmic arithmetic of function fields, Solution of a problem of Coleman-Mazur and* author of new mathematical notions: *Panchishkin distributions, Panchishkin condition for the existence of motivic p-adic L-functions.*

Since 1975 he published 80 publications in different prestigious journals. From 1986 he was the mentor of 15 Ph.D. theses.

Academician STEVAN PILIPOVIĆ

member of the Serbian Academy of Sciences and Arts (SANU)
Department of Mathematics and Informatics
University of Novi Sad
Novi Sad, Serbia
e-mail: stevan.pilipovic@gmail.com

Professor Stevan Pilipović was born in 1950 in Novi Sad, Serbia. After secondary school he became a student of Mathematics at the Faculty of Sciences of the University of Novi Sad. He got: in 1973 B.S., in 1977 M.S. and in 1979 Ph.D. in Mathematics.

After graduating he was teaching assistant, Assistant professor, Associate professor, and since 1987 he is a Full-time professor. Since 2009 he is a member of the Serbian Academy of Sciences and Arts (SANU), and since 2015 a president of the Novi Sad Branch of the SANU.

Research interests of academician Stevan Pilipović are: Generalized functions, Integral transformations, Pseudo-differential operators, Hyperfunctions, Microlocal analysis, Linear and nonlinear equations with singularities. Dynamical systems.
He published five monographs and more than 200 papers in renowned international and domestic journals and proceedings.

Stevan Pilipović is a Leader of the scientific seminar of Mathematical Colloquium at the Mathematical Institute of SANU, Belgrade as well as an editor and editor-in-chief in several international and domestic journals: Journal of Pseudo-Differential Operators and Applications, Birkhäuser (Basel); Integral Transforms and Special Functions, Taylor & Francis (London); Publication de l'Institute Mathematique (Belgrade) - one of the three Editors-in-Chief.

He was a visiting researcher and visiting professor at a number of different universities, including: Faculty of Mathematical Sciences of Tokyo University, University Paris 7; Ervin - Schrödinger Institute in Vienna, as well as invited lecturer at many scientific centers: Budapest University, Steklov Institute of RAN, Institute of mathematics of Bulgarian Academy of Sciences; Imperial College London, City College London, Max Plank Institute Leipzig, University of Helsinki, University of Kanpinas, University of Ghent.

Prof. Stevan Pilipović is a member of American Mathematical Society, London Mathematical Society, and Mathematical Society of Serbia.

He was mentor and co-mentor of 28 doctoral theses and of 21 magister theses. He works with many students and professors from Japan, USA, Italy, France, Austria, Spain, and all former Yugoslav republics.

Prof. Dr. MIRJANA VUKOVIĆ

corresponding member of Academy of Sciences and Arts BiH (ANUBiH)
Sarajevo, Bosnia and Herzegovina
e-mail: mirvuk48@gmail.com

Professor Mirjana Vuković was born in 1948 in Bosnia and Herzegovina. She attended primary school in different cities of ex-Yugoslavia. After graduating from the Grammar School *Third Gymnasium* in Sarajevo, she became a student of the Department of Mathematics of the University of Sarajevo, where she got her B.Sc. with the *Golden Badge* (1971), M.A. (1975), and Ph.D. (1979). There she started her mathematical career as an Assistant (1972), Assistant professor (1979), Associate professor (1984), and since 1989 a Full-time professor.

She works in several different domains of Analysis, but her principal domain is Algebra. Together with Marc Krasner she introduced extra- and para- graded structures (groups, rings, modules) developing the theory which is generalizing the corresponding Bourbaki-Krasner's graded structures and has in each of the three cases the property of closure with respect to the direct product and the direct sum [*Structures paragraduées* (*groupes, anneaux, modules*), Queen's Papers, Queen's University, Canada].

She was a researcher and visiting professor at many universities including: *Moscow's State Universit – Lomonosov,* Moscow, Russia; *University "Pierre et Marie Curie"*, Paris, France, where she worked for a long time with the eminent French mathematician Marc Krasner; *Institute Joseph Fourier*, Grenoble, France;*Technical University Vienna*, Austria; *Fields Institute,* Toronto, Canada, etc.

She is the author or co-author of more than 100 publications, including 1 monograph, 8 (text-) books. She has delivered many fundamental courses of lectures in different areas of analysis and algebra.

Mirjana Vuković was a member of many academic and expert councils, and commissions of the Department, Faculty and University Sarajevo and East-Sarajevo, including: Head of Division of Algebra, Department Chair, Vice-Dean of the Faculty, and Vice-Rector of the University of Sarajevo. She served as president of the Society of Mathematicians of Bosnia and Herzegovina.

She is a recipient of: *The April Sixth Award* of the City Sarajevo (1985); The highest Republic prize for scientific work *Veselin Masleša,* in Mathematics (1987). Since 2012 she is a corresponding member of the Academy of Sciences and Arts of Bosnia and Herzegovina (ANUBiH).

NOTES:

NOTES:

NOTES:

NOTES:

NOTES:

NOTES: