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Şerban Basarab at his 70th anniversary

On March 3, 2010, Şerban Basarab, a leading Romanian mathematician from the "Simion Stoilow" Institute of Mathematics of Romanian Academy Bucharest, had his seventieth anniversary.

Şerban Basarab is a friend of our Faculty of Mathematics since 1993, delivering here Algebra courses to our students, lectures in our scientific seminars, participating at all conferences and workshops in Algebra organized by our department (and they were a lot), becoming in 2006 Doctor Honoris Causa of the Ovidius University.

These have been the reasons of our decision of organizing, in honour of Şerban Basarab, an International Conference on Fundamental Structures of Algebra and of offering an issue of our journal (Analele Ştiinţifice ale Universităţii Ovidius, Constanţa, Seria Matematică), in order to publish some of the contributions in this conference. As Şerban Basarab is a Humboldt fellow, we asked financial support the Alexander von Humboldt Foundation and we got a substantial contribution from it. At the conference, we have seen how many friends, collaborators and fans has Professor Şerban Basarab. It is not easy to talk about such a multivalent personality as Şerban Basarab, with reach and interesting life and mathematical work. Born in Bucharest, in the family of the painter Alexandru Basarab, Şerban lost his father in 1941, in the first days of the War. In 1956, Şerban Basarab finished with honors his high school studies at the "Sfântul Sava" College in Bucharest.

In 1961 he graduated Faculty of Electronics of the Polytechnic Institute in Bucharest. He started to work as a researcher and designer at the Institute for Automatization and then at the Institute of Computing Technology in Bucharest, where he remained till 1970.

In 1964, he decided to follow his passion for Mathematics and enrolled at the Faculty of Mathematics of the Bucharest University. His abilities for Mathematics that have been remarked and developed in the high school made him one of the best students of the Faculty of Mathematics.

He got the M. Sc. degree in Mathematics in 1969 with a thesis on Galois cohomology under the supervision of Professor Ionel Bucur. He immediately has been hired by the Institute of Mathematics of the Romanian Academy. He

worked there till 1975, when the Communist Government abusively decided to dissolve the Institute of Mathematics. For ten difficult years, Şerban Basarab worked at the Institute for Informatics (ICI) in Bucharest, preparing his Ph.D. thesis on "Arithmetic and Model Theory". He started to work on this subject in 1970, with Professor Ionel Bucur, but, after his premature death, Şerban Basarab got in 1977 his Ph. D. degree under the supervision of Academician Octav Onicescu.

Between 1979 and 1982, Şerban Basarab was a Humboldt fellow at the Institute of Mathematics of the Heidelberg University, working in the group of the well-known Professor Peter Roquette. Professor Roquette influenced decisively the Romanian young mathematician. And Şerban worked since then in the fascinating Model Theory. In 1985, he came at the new founded National Institute INCREST, together with other good mathematicians in Romania. In 1990 the Institute of Mathematics was refounded. Here, between 1993 and 1999, Şerban Basarab has been its scientific secretary and between 1999 and 2004 its Director contributing at the development of this institution and to its becoming a Centre of Excellence in Europe. In 1991, Şerban Basarab was awarded the prize "Gh. Lazăr" of the Romanian Academy.

Şerban Basarab encouraged the researches in Algebra in Romania by participating at all conferences and workshops on Algebra in Bucharest, Iassy, Piteşti, Alba Iulia, etc.

For many years (1999-2005) Şerban Basarab held a Full Professor position at the Faculty of Mathematics of the Ovidius University where he delivered courses to master students. He encouraged here the researches in Algebra, delivering lectures in our Scientific Seminars, supporting some students for their Ph. D. theses. Şerban Basarab has had some young Ph. D. students who worked with him.

Şerban Basarab is well-known for his contributions in some branches of algebra:

In **Model Theoretical Algebra,** Şerban Basarab has accomplished a systematic study of Henselian valued fields of characteristic 0, of positive characteristic and with finite ramification index. His results include some classifying criteria, a new class of valued fields (prehenselian fields), a theorem of relative elimination of the quantifiers extending results of Angus Macintyre, Alexander Prestel and Peter Roquette, V. B. Weispfenning and Abraham Robinson, and also a criterion of isomorphism for algebraic Henselian valued fields over a common valued subfield.

Şerban Basarab developed an extension of the theory of formally p-adic fields elaborated by Simon Kochen and Peter Roquette. He investigated some situations when certain objects associated to a field extension F/K are obtained by the contraction of the corresponding objects associated to a field

extension N/K subject to $F < N$. As an application, the existence of some recursive bounds in the theory of fields and the theory of formally p-adic fields is proved. Devoted to the same field of interest, some of Basarab papers generalized the preorders of higher level introduced in 1979 by E. Becker. An operator theoretical description of the t-preorders of level n is given, recovering an unpublished result of P. Roquette in the particular case $n = 2$.

In some of his papers, Şerban Basarab gave interesting **extensions of the Hilbert's Nullstellensatz** over some ordered field, over closed p-adic fields, over closed pseudo-algebraic fields, inspired by some results of D. Dubois, G. Stenge, M. Jarden-P. Roquette, B. Jacob, K. McKenna.

Following James Ax and Alexander Prestel on the class of closed pseudo-real fields, Şerban Basarab studied important subclasses of these fields, answering some questions on the absolute Galois group of a closed pseudo-real field.

He characterized some elementary specific invariants for the models of elementary theories of non-axiomatizable classes of the finite Abelian groups, profinite groups and torsion groups; this characterization was used by Ugo Felgner for pseudofinite groups.

In collaboration with Dorin Popescu and Vasile Nica, Şerban Basarab studied suitable types of approximation in commutative rings, using concepts and results from the model theory.

In 1989, Şerban Basarab introduced the p-adic spectrum of a commutative ring. This allowed him to get a model-theoretical unitary approach for the procedure of compactification of affine algebraic varieties over local fields of characteristic 0, considered in 1984 by J. W. Morgan and P. Shalen in the real and complex cases.

In the **area of Diophantine Equations**, Şerban Basarab studied the closeness of rationality of points of an elliptic curve defined over a local field of characteristic 0 and of positive characteristic. He gave extensions for some results of Demianenko and Hellegourch concerning torsion points on elliptic curves over local and global fields. Using techniques of non-standard arithmetic, Şerban Basarab studied some problems connected with Class Field Theory and Diophantine Approximation Theory. Using Barry Mazur distributions, he approached them purely algebraically on distributive lattices and profinite groups.

In the **Arboreal Theory of Groups,** Şerban Basarab has obtained important results. So, in 1989, he generalized some constructions and basic results from the first chapter of Serre's book on Trees. Then he developed a transfer method for generalized trees and applied it to the study of the actions of groups on groupoids and on distributive lattices, including the classical

Tits construction. His papers published in Communications in Algebra, Fundamenta Informaticae, Journal of Pure and Applied Algebra in 1997, 1998, 2002, introduced an interesting class of groups, - the arboreal discrete hyperbolic groups, - then studied this class and generalized the concept of arboreal group to that of arboreal groupoid.

In this theory, the very recent contributions of Şerban Basarab are the study of the arithmetic-arboreal residue structures induced by Prüfer extensions (an axiomatic approach and not only it) and the embedding theorems for actions on generalized trees. His results have been presented in our Seminar of Algebra.

Finally, Şerban Basarab has contributions in the **Cogalois theory**. Jointly with professor Toma Albu he discovered an abstract Cogalois Theory for arbitrary profinite groups which extends the field theoretical Cogalois Theory, a fairly recent topic of Field Theory born 25 years ago.

Citations of his works occur in papers and books of P. Roquette, A. Prestel, J. Ershov, W. Hodges, D. Popescu, M. Jarden, U. Felgner, E. Becker, F. Pop, V. Weispfenning, F. R. Kuhlmann, D. Haran, F. Delon, L. Belair, G. Georgescu, M. Roller, R. Farre, A. Solian, etc; 16 papers of Basarab are mentioned in thed Omega Bibliography of Mathematical Logic (Springer, 1987).

The author of this short presentation had the privilege to know Şerban Basarab for a lot of years, since 1983, to talk many times with him about mathematics and some cultural topics. Şerban is a charming partner in talking and his knowledge is amazingly broad. When I asked him to help me with building a school of algebra in Constanţa University, he has done the best for it. Let me thank him for his efforts during the last decades.

On behalf of all staff in our department, we are wishing Şerban Basarab new successes in his future activity!

Mirela Ştefănescu
Editor-in-Chief