Conference on Mathematical Logic, dedicated to the memory of Ivan Soskov, September 20 - 22, 2014, Gyolechitsa, Bulgaria

Saturday, September 20

9:00 Yiannis N. Moschovakis, UCLA and University of Athens
"The normed induction theorem"

10:00 Dimitar Skordev, Sofia University
"Ivan Soskov's work on computability on first-order structures"

11:00 Hristo Ganchev, Sofia University
"Omega-enumeration degrees"

Sunday, September 21

9:00 S. Barry Cooper, University of Leeds
"Some Things Happen for No Reason …"

10:00 Alexandra Soskova, Sofia University
"A parallel between classical computability theory and effective definability in abstract structures. The last paper of Ivan Soskov"

10:45 Ivan Georgiev, University "Prof. Assen Zlatarov", Bourgas
"On the notion of conditional computability of real functions"

11:25 Dimitar Vakarelov, Sofia University
"Whiteheadian type of integrated point-free theories of space and time"

17:30 Mariya Soskova, Sofia University
"Definability, automorphisms and enumeration degrees"

18:30 Lyubomir Ivanov, Institute of Mathematics and Informatics, BAS
"Antarctic Geographic Information 2013-14: Bulgaria's Contribution"

Monday, September 22

9:00 Angel Ditchev, Sofia University
"Some properties of an algebra of all sets of natural numbers, e-reducible to a fixed set"

9:35 Stoyan Mihov, Institute of Information and Communication Technologies, BAS
"Programming in Mathematics"

10:25 Tinko Tinchev, Sofia University, Philippe Balbiani, IRIT, France
"PDL with parallel composition: high undecidability in the class of well-founded frames"

11:00 Dimitar Birov, Sofia University
"Software Architecture Description languages, Formalisms, Tools and Industry Usability"
Abstracts

Saturday, September 20

Yiannis N. Moschovakis, UCLA and University of Athens
"The normed induction theorem"
This is a very simple theorem, which provides explicit definitions for inductively defined relations in structured - but very general - contexts. It is very old, from the 70's, but some of its implications (especially for effective descriptive set theory) had not been understood until recently. My aim in this talk is to explain it and discuss some of its applications in an elementary way, assuming only the basic facts about recursive functions and the arithmetical and analytical hierarchies.

Dimiter Skordev, Sofia University
"Ivan Soskov’s Work on Computability on First-Order Structures"
Ivan Soskov was one of the active and successful researchers of computability on first-order structures. His research encompasses essential problems concerning the internal and the external approach to the notion and the interconnection between them. A number of valuable results in this field were presented in Soskov's Master Theses, Ph. D. Thesis and Dr. Hab. Thesis (defended at Sofia University in 1979, 1983 and 2001, respectively), as well as in a number of other works of him. An attempt to list the most interesting among these results will be done in the talk.

S. Barry Cooper, University of Leeds
"Some Things Happen for No Reason …"
This is a quote from Robin Gandy, and the talk discusses the relevance of higher order computation, and definability over structures involving relative computation.

Alexandra Soskova, Sofia University
"A parallel between classical computability theory and effective definability in abstract structures. The last paper of Ivan Soskov"
In his last paper, Soskov generalizes the method of Marker's extensions for a sequence of structures. He demonstrates that for any sequence of structures its Marker's extension codes the elements of the sequence, so that the n-th structure of the sequence appears positively at the n-th level of the definability hierarchy. The results provide a general method given a sequence of structures to construct a structure with n-th jump spectrum contained in the spectrum of the n-th member of the sequence. As an application a structure with spectrum consisting of the Turing degrees which are non-low-n for all n<ω is obtained. Soskov shows also an embedding of the ω-enumeration degrees into the Muchnik degrees generated by spectra of structures.
Sunday, September 21

Mariya Soskova, Sofia University
"Definability, automorphisms and enumeration degrees"

I would like to share with you the work that I have been doing during the two years I spent at UC Berkeley. I will talk about the quest for showing the definability of the total enumeration degrees and how this problem was finally solved. I will then describe an application of this result that ties the automorphism problems of the structure of the enumeration degrees and the structure of the c.e. Turing degrees.

Ivan Georgiev, University "Prof. Assen Zlatarov", Bourgas
"On the notion of conditional computability of real functions"

The class of uniformly computable real functions with respect to a small subrecursive class of operators computes the elementary functions of calculus, restricted to compact subsets of their domains. The class of conditionally computable real functions with respect to the same class of operators is a proper extension of the class of uniformly computable real functions and it computes the elementary functions of calculus on their whole domains. The definition of both classes relies on certain transformations of infinitistic names of real numbers. In the present talk, the conditional computability of real functions is characterized in the spirit of Tent and Ziegler, avoiding the use of infinitistic names.

Dimiter Vakarelov, Sofia University
"Whiteheadian type of integrated point-free theories of space and time"

Some Whiteheadian type of point-free theories of space and time are presented. Here "point-free" means that neither space points, nor time moments are assumed as primitives. The theory has an algebraic formulation called dynamic contact algebra (DCA), which is a Boolean algebra whose elements symbolize dynamic regions changing in time, with several spatio-temporal relations between regions: space contact, time contact, preceding and some other. A class of intended standard models of DCA-s of topological kind is introduced, which is a reason to call DCA-s dynamic mereotopologies. The main result of the paper is a kind of representation theorem which shows that each DCA from a given class of DCA-s is isomorphic with some DCA of standard type from the same class.

Lyubomir Ivanov, Institute of Mathematics and Informatics, BAS
"Antarctic Geographic Information 2013-14: Bulgaria's Contribution"

The report analyzes the priorities in the choice of particular regions and nameless geographic features in the process of Bulgarian place naming in Antarctica, and their application to the case of 142 new names given in the period August 2013 to August 2014. Presented is the geographic distribution, origins, publication and popularization of the new Bulgarian names, with a reference to some recent expert debate on the relevant policies and contribution to Antarctic toponymy by the United States, Britain and Bulgaria.
Angel Ditchev, Sofia University  
"Some properties of an algebra of all sets of natural numbers, e-reducible to a fixed set"

In some previous works the author has presented a characterization of the partial structures that have least enumerations. In this work for any fixed set of natural numbers $A$ we consider a special algebra $N^A$ of all sets of natural numbers, e-reducible to $A$. It is shown that for any $A$ this algebra has a least enumeration, admits equivalent representation with 3 operators and is finitely generated.

Stoyan Mihov, Institute of Information and Communication Technologies, BAS  
"Programming in Mathematics"

We present a novel programming language intended to directly compile mathematical constructions expressed in the terms of set abstraction, induction and others into efficient C programs. The language is declarative, functional and strongly typed. The system provides efficient implementation of high level structures for finite sets, functions, relations together with optimal (in some sense) memory management. Using the language one can use the formal mathematical description of a construction for both — presenting the mathematical concept and producing the corresponding working C program.

Tinko Tinchev, Sofia University and Philippe Balbiani, IRIT, France  
"PDL with parallel composition: high undecidability in the class of well-founded frames"

Propositional dynamic logic (PDL) is a modal logic with a structure in the set of modal operators, called programs. A number of variants of PDL are investigated in the last 40 years. Most of these variants have a Kripke semantics such that the states of the models in which formulas are evaluated have no internal structure. PRSPDL, the propositional dynamic logic with storing, recovering and parallel composition introduced by Benevides et al., is a separation-based non-classical logic. The semantics of PDL is extended by considering Kripke models structured by means of a function $*$: the state $x$ is the result of applying the function $*$ to the states $y, z$ iff $x$ can be separated in a first part $y$ and a second part $z$. The syntax of PDL is extended as well by adding the binary program construct of parallel composition and 4 program constants (2 storing programs and 2 recovering programs). In this variant, the parallel composition corresponds to the fork operation. In a recent paper presented at AiML 2014 we have shown the high undecidability of the satisfiability problem in a number of classes of Kripke models. Here we demonstrate the same complexity result about an important class of Kripke models.

Dimiter Birov, Sofia University  
Title: Software Architecture Description languages, Formalisms, Tools and Industry Usability

Architecture Description Languages (ADLs) are domain specific formal languages for describing the structure and behavior of software-intensive system's architecture. Main problem of the existing ADLs is high degree of formality which makes difficult their integration in industrial lifecycle. We will discuss some formal calculus (pi-calculus) and it's expressiveness and usability for analysis and reason about structural and behavioral properties of software architectures.