Computable Model Theory
Arriving Sunday, November 3 and departing Friday November 8, 2013

MEALS

*Breakfast (Buffet): 7:00–9:30 am, Sally Borden Building, Monday–Friday
*Lunch (Buffet): 11:30 am–1:30 pm, Sally Borden Building, Monday–Friday
*Dinner (Buffet): 5:30–7:30 pm, Sally Borden Building, Sunday–Thursday
Coffee Breaks: As per daily schedule, in the foyer of the TransCanada Pipeline Pavilion (TCPL)
*Please remember to scan your meal card at the host/hostess station in the dining room for each meal.

MEETING ROOMS

All lectures will be held in the TransCanada Pipelines Pavilion (TCPL). LCD projector and blackboards are available for presentations. Ceiling-mounted video cameras are installed in the main lecture room of 201, TCPL. Morning lectures will be in room 201, and afternoon lectures will be in room 202.

SCHEDULE

Sunday

16:00	Check-in begins (Front Desk - Professional Development Centre - open 24 hours)
17:30–19:30	Buffet Dinner, Sally Borden Building
20:00	Informal gathering in 2nd floor lounge, Corbett Hall
	Beverages and a small assortment of snacks are available on a cash honor system.

Monday

7:00–8:45	Breakfast
8:45–9:00	Introduction and Welcome by BIRS Station Manager, TCPL
9:00–9:50	Speaker: **Montalban, Antonio** (University of California, Berkeley), TCPL 201
	Title: *Properties on a Cone, and Sigma-Small theories*
10:00–10:30	Coffee Break, TCPL
10:30–11:20	Speaker: **Andrews, Uri** (University of Wisconsin at Madison), TCPL 201
	Title: *Relative recursiveness of models of a strongly minimal theory*
11:30–13:00	Lunch
13:00–14:00	Guided Tour of The Banff Centre; meet in the 2nd floor lounge, Corbett Hall
14:00	Group Photo; meet on the front steps of Corbett Hall
14:30–14:50	Speaker: **Kalimullin, Iskander** (Kazan Federal University), TCPL 202
	Title: *Limitwise monotonic sets of reals*
15:00–15:30	Coffee Break, TCPL
15:30–15:50	Speaker: **Melnikov, Alexander** (Victoria University of Wellington), TCPL 202
	Title: *Effectively presented abelian groups: some open problems*
17:30–19:30	Dinner

Tuesday

7:00–9:00	Breakfast
9:00–9:50	Speaker: **Csima, Barbara** (University of Waterloo), TCPL 201
	Title: *Degrees of Categoricity and Related Notions*
10:00–10:30	Coffee Break, TCPL
10:30–11:20	Speaker: **Solomon, David Reed** (University of Connecticut), TCPL 201
	Title: *Examples of low for isomorphism degrees*
11:30–13:30	Lunch
14:00–14:50	Speaker: **Morozov, Andrey S.** (Sobolev Institute of Mathematics and Novosibirsk State University), TCPL 202
	Title: *Computable models over HF(R)*
15:00–15:30	Coffee Break, TCPL
15:30–15:50	Speaker: **Lempp, Steffen** (University of Wisconsin–Madison), TCPL 202
	Title: *Some recent results on possible spectra of strongly minimal theories in infinite recursive binary relational languages*
17:30–19:30	Dinner

Wednesday

7:00–9:00	Breakfast
9:00–9:50	Speaker: **Khoussainov, Bakhadyr** (University of Auckland), TCPL 201
	Title: *Computably Enumerable Structures*
10:00–10:30	Coffee Break, TCPL
10:30–11:20	Speaker: **Puzarenko, Vadim** (Sobolev Institute of Mathematics (Novosibirsk)), TCPL 201
	Title: $\aleph_0$ *categoricity in Admissible Fragments*
11:30–13:30	Lunch
	Free Afternoon
17:30–19:30	Dinner

Thursday

7:00–9:00	Breakfast
9:00–9:50	Speaker: **Miller, Russell** (Queens College (City University of New York)), TCPL 201
	Title: *The theory of fields is complete for isomorphisms*
10:00–10:30	Coffee Break, TCPL
10:30–10:50	Speaker: **Fokina, Ekaterina** (Kurt Goedel Institute Vienna), TCPL 201
	Title: *Equivalence relations on computable structures*
11:00–11:20	Speaker: **Turetsky, Dan** (Kurt Goedel Research Centre (University of Vienna)), TCPL 201
	Title: *Large Degree Spectra*
11:30–13:30	Lunch
15:00–15:30	Coffee Break, TCPL
17:30–19:30	Dinner

Friday

7:00–9:00	Breakfast
10:00–11:00	Coffee Break, TCPL
11:30–13:30	Lunch
Checkout by	
12 noon.	

** 5-day workshop participants are welcome to use BIRS facilities (BIRS 2nd floor lounge, TCPL and

Reading Room) until 3 pm on Friday, although participants are still required to checkout of the guest rooms by 12 noon. **

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ABSTRACTS
(in alphabetic order by speaker surname)

Speaker: **Andrews, Uri** (University of Wisconsin at Madison)
Title: *Relative recursiveness of models of a strongly minimal theory*
Abstract: We show that if a strongly minimal theory has one recursive model then every model is recursive in $0^{(4)}$. In some special cases we can lower this bound to $0^{(3)}$ or even $0^{(2)}$. I will talk about the main result about the $0^{(4)}$ bound and some of our attempts to lower this bound. (Work joint with Julia F. Knight)

Speaker: **Csima, Barbara** (University of Waterloo)
Title: *Degrees of Categoricity and Related Notions*
Abstract: A degree $\mathbf{d}$ is a degree of categoricity if there is a computable structure A that is $\mathbf{d}$-categorical, and moreover, any $\mathbf{c}$ such that A is $\mathbf{c}$-categorical is such that $\mathbf{c} \geq \mathbf{d}$. We present a review of what is known about degrees of categoricity (perhaps with help from the audience), mention open questions, and discuss possible approaches.

Speaker: **Kalimullin, Iskander** (Kazan Federal University)
Title: *Limitwise monotonic sets of reals*
Abstract: (jointly with M. Maizrahmanov) A set A of reals is called limitwise monotonic in a degree $\mathbf{x}$ if the family of lower Dedekind cuts of the elements of A is uniformly $\mathbf{x}$-c.e. We show that there are set of reals which are limitwise monotonic in all degrees except zero. As a consequence, we find new examples of families for which uniform and non-uniform reducibilities are not equivalent. The research is supported by grants MD-4838.2013.1 and RFBR-12-01-31389.

Speaker: **Khoussainov, Bakhadyr** (University of Auckland)
Title: *Computably Enumerable Structures*
Abstract: We investigate the dependence of computably enumerable structures on the equality relation which is fixed to a specific c.e. equivalence relation. In particular we compare c.e. equivalence relations in terms of classes of structures they permit to represent. Through this, we define partially ordered sets that depend on classes of structures under consideration. We investigate some algebraic properties of these partially ordered sets. For instance, we show that some of these partial ordered sets possess atoms, minimal and maximal elements. We also fully describe the isomorphism types some of those partial orders.

    This is a new work that brings in a fresh view and new ideas on interactions between algebraic structures and computability. The work is joint with F. Stephan (NUS), S. Jain (NUS) and A.Gavryushkin (AUT)

Speaker: **Lempp, Steffen** (University of Wisconsin–Madison)
Title: *Some recent results on possible spectra of strongly minimal theories in infinite recursive binary relational languages*
Abstract: (joint with Uri Andrews) I will present some recent results on possible spectra of strongly minimal theories in infinite recursive binary relational languages (joint with Andrews) and some thoughts on one one might extend this to disintegrated theories of higher arity.

Speaker: **Melnikov, Alexander** (Victoria University of Wellington)
Title: *Effectively presented abelian groups: some open problems*
Abstract: We will discuss several open problems in the area of effectively presented abelian groups. Some of these problems have resisted solution for over 30 years.

Speaker: **Miller, Russell** (Queens College (City University of New York))

Title: *The theory of fields is complete for isomorphisms*

Abstract: Abstract: We give a highly effective coding of countable graphs into countable fields. For each countable graph G, we build a countable field F(G), uniformly effectively from an arbitrary presentation of G. There is a uniform effective method of recovering the graph G from the field F(G). Moreover, each isomorphism g from G onto any G' may be turned into an isomorphism F(g) from F(G) onto F(G'), again by a uniform effective method so that F(g) is computable from g. Likewise, an isomorphism f from F(G) onto any F(G') may be turned back into an isomorphism g with F(g)=f. Not every field F isomorphic to F(G) is actually of the form F(G'), but for every such F, there is a graph G' isomorphic to G and an isomorphism f from F onto F(G'), both computable in F.

It follows that many computable-model-theoretic properties which hold of some graph G will carry over to the field F(G), including spectra, categoricity spectra, automorphism spectra, computable dimension, and spectra of relations on the graph. By previous work of Hirschfeldt, Khoussainov, Shore, and Slinko, all of these properties can be transferred from any other countable, automorphically nontrivial structure to a graph (and then to various other standard classes of structures), so our result may be viewed as saying that, like these other classes, fields are complete for such properties.

This work is joint with Jennifer Park, Bjorn Poonen, Hans Schoutens, and Alexandra Shlapentokh.

Speaker: **Montalban, Antonio** (University of California, Berkeley)

Title: *Properties on a Cone, and Sigma-Small theories*

Abstract: In the last few years, there are two main themes that showed up in different forms in the authors research: Properties on a Cone, and Sigma-Small theories. We'll define these notions, and survey what's known about them.

Speaker: **Morozov, Andrey S.** (Sobolev Institute of Mathematics and Novosibirsk State University)

Title: *Computable models over HF(R)*

Abstract: A structure is called Σ–definable over an admissible set, if its diagram is Σ–definable over it. This notion can be considered as one of possible generalizations of the notion of computable structure, where Σ–definability is used instead of computable enumerability.

The hereditarily finite superstructure HF(R) over the ordered field of reals R seems to be one of the most interesting admissible sets for the study of uncountable structures. Some popular structures like C (the field of complex numbers), H (quaternions), rings of polynomials over them, matrix groups GL(n,R), SL(n,R), etc., have Σ–presentations over HF(R), i.e., they could be considered as 'computable structures over HF(R). In the talk, there will be presented some results on the existence, on the number of possible Σ–presentations, and on the existence of good parameterizations over HF(R), for some natural structures.

Speaker: **Puzarenko, Vadim** (Sobolev Institute of Mathematics (Novosibirsk))

Title: $\aleph_0$ *categoricity in Admissible Fragments*

Abstract: I will tell about a criterion of the property to be $\aleph_0$ categorical for structures in admissible fragments. I recall that all the computable infinite formulas form such a fragment. This heme is closely connected with a series of problems from computable model theory.

Speaker: **Solomon, David Reed** (University of Connecticut)

Title: *Examples of low for isomorphism degrees*

Abstract: A degree d is low for isomorphism if every pair of computable structures which are d-isomorphic are also computably isomorphic. This talk will focus on the known positive and negative examples of low for isomorphism degrees.