Model Theory and its Applications
Abstracts

Saturday 3:15 – 5:15
Jana Marikova, Western Illinois University
Margaret Thomas, Universität Konstanz
Laurel Miller-Sims, Smith College
Alice Medvedev, UC Berkeley

Sunday 8:30 – 10:30
Karen Lange, Wellesley College
Meghan Anderson, Harvard University
Monica van Dieren, Robert Morris University
Rehana Patel, Harvard University/Wesleyan University

Saturday 3:15 – 5:15

Definable sets in o-minimal fields with convex subrings
Jana Marikova, Western Illinois University

The class of structures (R,V), where R is an o-minimal field and V is a convex subring such that the residue field is o-minimal, is first order axiomatizable. We investigate the question whether these structures yield a good generalization of the T-convex case.

Rational points on definable sets and integer-valued functions
Margaret Thomas, Universität Konstanz

Following the influential theorem of Pila and Wilkie concerning the density of rational and algebraic points lying on sets definable in o-minimal expansions of the real field, Wilkie has conjectured an improvement to the result for sets definable in the real exponential field. We shall review some partial results in this direction, including the proven one-dimensional case of the conjecture, and shall illustrate how this can already be applied in considering the growth behaviour of integer-valued definable functions.

TITLE
Laurel Miller-Sims, Smith College
ABSTRACT

A strictly simple theory with many many fields
Alice Medvedev, UC Berkeley

An action of (Q, +) on a field F is a collection of automorphisms of F indexed by rational numbers, such that composition of automorphisms corresponds precisely

to addition of indices. The model companion QACFA of the theory of fields with an action of (Q, +) is a simple theory, neither stable nor supersimple, closely related to ACFA. The fixed fields of the many automorphisms form an infinite lattice of definable fields between two algebraically closed fields: the type-definable intersection of all fixed fields, and the Ind-definable union of them all. This talk is about these fields and that lattice.

Sunday 8:30 – 10:30

GENERALIZED POWER SERIES AND REAL CLOSED FIELDS
Karen Lange, Wellesley College

An integer part I for an ordered _eld R is a discrete ordered subring containing 1 such that for all r 2 R there exists a unique i 2 I with i _ r < i+1. Mourgues and Ressayre [1] showed that every real closed _eld R has an integer part by constructing a special embedding of R into a _eld khhGii of generalized power series. Let k be the residue _eld of R, and let G be the value group of R. The _eld khhGii consists of elements of the form _g2Sagg where ag 2 k and the support of the power series S _ G is well ordered. Ressayre [2] showed that every real closed exponential _eld has an integer part I that is closed under 2x for positive elements of I using the same approach as in [1]. However, he had to choose more carefully the value group G and the embedding of R into khhGii. We demonstrate that these alterations cause Ressayre's construction in the exponential case to be much more complex than Mourgues and Ressayre's original construction.This is joint work with Paola D'Aquino, Julia Knight, and Salma Kuhlmann.

References
[1] M. H. Mourgues and J.-P. Ressayre, \Every real closed _eld has an integer part," J. Symb. Logic, vol. 58 (1993), pp. 641-647.
[2] J.-P. Ressayre, \Integer parts of real closed exponential _elds," in Arithmetic, Proof Theory, and Computational Complexity, Oxford Logic Guides, vol. 23 (1993), pp. 278-288.

Solution Spaces to Linear Equations in Valued D-Fields
Meghan Anderson, Harvard University

A D-field is a field endowed with a derivative-like operator obeying a (possibly) twisted Leibniz rule. Both difference and differential fields can be seen as D-fields. When a valuation is introduced, interacting with the operator in the proper way, both cases can be considered in the same structure, with good model theoretic properties. We'll look at the solution spaces to linear equations in such structures.

Independence results in the model theory of infinitary logics

Monica van Dieren, Robert Morris University

Initial results in the development of model theory of infinitary logic were splattered with set theoretic assumptions and sometimes turned to be independent of ZFC. Later on set theoretic assumptions continued to show up in model theoretic results for non-first order logics because they served as a stand-in for compactness. We will provide a brief history of the interplay between set theory and model theory and highlight some recent advancements.

Invariant Measures on Countable Models

Rehana Patel, Harvard University/Wesleyan University

The Erdos-Renyi random graph construction can be seen as inducing a probability measure concentrated on the Rado graph (sometimes known as the countable ``random graph") that is invariant under arbitrary permutations of the underlying set of vertices. A natural question to ask is: For which other countable combinatorial structures does such an invariant measure exist? Until recent work of Petrov and Vershik (2010), the answer was not known even for Henson's countable homogeneous-universal triangle-free graph.

In this talk we will provide a characterization of countable relational structures that admit invariant measures, in terms of the notion of definable closure. This leads to new examples and non-examples, including a complete list of homogeneous graphs satisfying our criterion, as well as certain directed graphs and partial orders. Joint work with Nathanael Ackerman and Cameron Freer.