Book of Abstracts

European Conference in Interdisciplinary Model Theory

MÜNSTER, 07/03/2022 · 11/03/2022

ECIMT is a week-long conference happening in Münster, aiming to bring together young researchers interested in Model Theory, and to explore interactions between Model Theory and other mathematical fields, most notably Combinatorics, Algebra and Number Theory.

For any question, contact ecimt [at] uni-muenster [dot] de.

SCHEDULE

	Monday	Tuesday	Wednesday	Thursday	Friday
09:30 - 10:00	REGISTRATIONS	COFFEE	COFFEE	COFFEE	COFFEE
10:00 - 11:00	Halupczok	Mantova	Anscombe	Mantova	Mantova
11:15 - 12:15	Bradley-Williams	Müller	Chatzidakis	Lösch	Colla
12:30 - 14:00	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
14:00 - 15:15	Anscombe	Anscombe	Halupczok	Halupczok	Aranda
15:15 - 16:30	Marimon	Kamsma	Hempel	Braunfeld	Bleybel
16:30 - 17:00	BREAK	BREAK	BREAK	BREAK	BREAK
17:00 - 18:00	Lavi	Gavrilovich	Konečný	Chevalier	Bodor

All talks will take place in the M2 ROOM in the Lecture Hall Building in Einsteinstrasse 64.

TUTORIALS

Sylvy Anscombe: *TBA*

TBA

Immanuel Halupczok: *Introduction to Hensel minimality*

In real closed fields, o-minimality has been extremely successful as a tameness condition for definable sets. In this minicourse, I will present an analogue notion for (Henselian) valued fields, called "Hensel minimality", or "h-minimality", for short. (This is a collaboration with Cluckers, Rideau and Vermeulen.) Like o-minimality, h-minimality imposes a condition on definable subsets of the line, which has many geometric consequences, like the existence of a notion of dimension, cell decomposition, almost everywhere differentiability of definable functions, and more. In addition, there are "resplendency" results, stating that h-minimality is preserved under expansions of the langauge on the value group and on the residue field. In the minicourse, I will explain and motivate the

definition and various consequences. While I might give one or two proofs to illustrate some techniques, the main focus will be on intuition and on examples, since proofs tend to be rather fiddly (as in o-minimality).

Vincenzo Mantova: *TBA*

TBA

INVITED TALKS

Zoé Chatzidakis: *Measures on perfect PAC fields*

This is work in progress, joint with Nick Ramsey (UCLA).

A conjecture, now disproved by Chernikov, Hrushovski, Kruckman, Krupinski, Pillay and Ramsey, asked whether any group with a simple theory is definably amenable. It is well known that the counting measure on finite fields gives rise to a non-standard counting measure on pseudo-finite fields (the infinite models of the theory of finite fields). It was unknown whether other PAC fields possessed a reasonable measure, and in this talk, we will show that some of them do, although the measure we define does not have all the nice properties of a counting measure when the field is not pseudo-finite.

This result can be used to show that if G is a group definable in an e-free perfect PAC field, then G is definably amenable. It extends to groups definable in omega-free PAC fields. I will also discuss possible extensions to wider classes of perfect PAC fields.

Nadja Hempel: *Connected Component in n-dependent groups*

1-dependent theories better known as NIP theories are the first class of the hierarchy of n-dependent structures. The random n-hypergraph is the canonical object which is n-dependent but not $(n-1)$-dependent. Thus the hierarchy is strict. In a joint work with Chernikov, we proved the existence of strictly n-dependent groups for all natural numbers n and we started studying their properties. The connected component over A, inspired by the definition of the connected component of algebraic group, is the intersection of all A-type definable subgroups of bounded index. A crucial fact about (type)definable groups in 1-dependent theories is the absoluteness of their connected components: Namely given a definable group G and a small set of parameters A, we have that the connected component of G over A coincides with the one over the empty set. We will give examples of n-dependent groups and discuss a generalization of absoluteness of the connected component to n-dependent theories.

Isabel Müller: *TBA*

TBA

CONTRIBUTED TALKS

Andres Aranda: *All those Fraïssé theorems*

A countable structure M belongs to the morphism extension class XY if all homomorphisms of type X with finite domain are restrictions of an endomorphism of M of type Y. For example, homomorphism-homogeneous structures are HH-homogeneous and ultrahomogeneous structures are IA-homogeneous. We present a uniform way to derive Fraïssé theorems for all XY-morphism extension classes.

Ali Bleybel: *The causal automorphism group of a two-dimensional globally hyperbolic Lorentzian manifold*

We study the causal automorphism group of a two-dimensional globally hyperbolic Lorentzian manifold with non-compact Cauchy surfaces. Using back-and-forth, we provide a classification of the groups of causal automorphisms of two-dimensional globally hyperbolic Lorentzian manifolds.

Bertalan Bodor: *TBA*

TBA

David Bradley-Williams: *TBA*

TBA

Samuel Braunfeld: *Monadic dividing lines and hereditary classes*

A theory T is monadically NIP if every expansion of T by unary predicates is NIP. We will discuss how monadic NIP manifests in the theory T itself rather than just in unary expansions, and how this can be used to produce structure or non-structure in hereditary classes. Monadic stability and monadic NFCP may also make some appearance.

Alexis Chevalier: *A hypergraph regularity lemma in* ACFA

In his 2012 paper 'Expanding Polynomials...', Tao proves a Szemeredi-style algebraic regularity lemma for definable graphs in finite fields, and asks if this result can be generalised to definable hypergraphs. We will see that this is possible, and we will show that the result holds more generally for definable hypergraphs in ACFA of finite total dimension. Our main tool is the model theory of ACFA and Hrushovski's twisted Lang-Weil estimates. This is joint work with Elad Levi.

Eugenio Colla: *Classification of Ramsey monoids*

Recently, Solecki defined Ramsey monoids and Y-controllable monoids to generalize celebrated results in Ramsey theory. In modern terms, Hindman's theorem, infinitary

Hales-Jewett theorem, and Gowers' FIN_k theorem state that some monoids are Ramsey. The fact that certain monoids are Y-controllable implies Furstenberg-Katznelson Ramsey theorem. We prove that a monoid is Ramsey if and only if it is finite, aperiodic, and has a certain linear order. We obtain analogous partial results for Y-controllable monoids. These theorems improve those of Solecki and connect these notions with Schützenberger's theorem, one of the most influential theorems in automata theory. The proof uses rather basic notions from model theory, such as coheir and coheir sequence.

Misha Gavrilovich: *A category-theoretic interpretation of NTP and NSOP*

Combinatorial reformulations of the Shelah's dividing lines of NTP_i (no tree property), NOP (no order property), NSOP_i, and others, can be expressed as commutative diagrams in a certain category containing, as full subcategories, that of topological spaces, of uniform spaces, and of simplicial sets. I shall explain this observation.

Mark Kamsma: *Bilinear spaces over a fixed field are simple unstable*

We study the model theory of vector spaces with a bilinear form over a fixed field. For finite fields this can be, and has been, done in the classical framework of full first-order logic. For infinite fields we run into issues with compactness and we need a different logical framework. In this talk we will take the approach of positive logic, a framework that is very close to full first-order logic, but where negation is not built in (but can be added as desired). Positive logic allows us to study bilinear spaces over any fixed field. The arising positive theory turns out to be simple unstable. We also fully characterise its existentially closed models. Time permitting, we will also discuss some other interesting facts about this theory, concerning elimination of quantifiers and omega-categoricity.

Matěj Konečný: *Big Ramsey degrees of hypergraphs*

When the vertex set of a homogeneous structure is enumerated, complicated combinatorial phenomena emerge. Studying them is the content of big Ramsey theory. In this talk I will give a brief introduction into the area and outline some recent results about big Ramsey degrees of hypergraphs of arbitrary arity.

Noa Lavi: *New irreducible generalised power series*

A classical tool in the study of real closed fields are the fields $K((G))$ of generalised power series (i.e., formal sums with well-ordered support) with coefficients in a field K of characteristic o and exponents in an ordered abelian group G. A fundamental result of Berarducci ensures the existence of irreducible series in the subring $K((G_{\leq 0}))$ of $K((G))$ consisting of the generalised power series with non-positive exponents. We generalize previous results and show that for certain order types almost all series are irreducible or irreducible up to a monomial.

Michael Lösch: *Transfer of internality and additive covers*

Baldwin and Lachlan showed that uncountably categorical theories are controlled by a strongly minimal set. For example, every uncountably categorical infinite simple group is almost strongly minimal, i.e. algebraic over a strongly minimal set.

There is a natural way to produce uncountably categorical structures which are no longer almost strongly minimal in terms of covers of a strongly minimal set, where each fiber is in definable bijection with a fixed strongly minimal set, i.e. internal to it.

This talk will present two properties, which already appeared in Chatzidakis's work on the canonical base property (CBP), regarding a descent of internality. These properties (or rather the lack thereof) allow a structural study of the CBP in additive covers of the complex numbers.

Paolo Marimon: *Non-measurability in ω-categorical Hrushovski constructions*

A structure is MS-measurable if it admits a dimension-measure function on its definable sets satisfying certain definability, additivity and Fubini conditions. MS-measurable structures are necessarily supersimple of finite SU-rank. Elwes and Macpherson (2008) asked whether the converse is true in an omega-categorical context. In this talk I will present some non-measurability results concerning omega-categorical Hrushovski constructions. Especially, generalizing unpublished results of Evans, I will show that various classes of omega-categorical Hrushovski constructions (supersimple of finite SU-rank) are not MS-measurable. I will further discuss ongoing work in the context of invariant Keisler measures.