IMS Graduate Summer School in Logic 2026
Abstracts

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Dp-minimal Theories

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The class of *dp-minimal theories* contains many of the important theories in model theory, such as o-minimal theories, strongly minimal theories, Presburger arithmetic, and the theory of the p-adic numbers. Dp-minimal theories can be seen as the "1-dimensional" NIP theories. Although the class of dp-minimal theories is big, admitting many examples, it is small enough that we can prove many non-trivial things about dp-minimal theories. In a dp-minimal theory, *dp-rank* yields a good notion of dimension for definable sets. Under some mild topological assumptions, dp-minimal theories have topological tameness for definable sets, generalizing what happens in o-minimal theories. For example, definable functions are generically continuous, there is a weak form of cell decomposition, and definable groups have a natural manifold structure. Dp-minimal theories of fields always satisfy these topological assumptions. In the summer school, we will work through much of the above. We will also discuss some related results without proof, such as the known results on dp-minimal fields, rings, groups, and ordered groups, and other examples of dp-minimal theories.

References:

- Alfred Dolich, John Goodrick, David Lippel. "Dp-minimality: basic facts and examples"
- Will Johnson. "The canonical topology on dp-minimal fields"
- Itay Kaplan, Alf Onshuus, and Alexander Usvyatsov. "Additivity of the dp-rank"
- Pierre Simon. *A Guide to NIP Theories*, Chapters 1-4
- Pierre Simon. "Dp-minimality: invariant types and dp-rank"
- Pierre Simon and Erik Walsberg. "Tame topology over dp-minimal structures"

Further reading:

- Hans Adler. "Strong theories, burden, and weight"
- Hans Adler. "Theories controlled by formulas of Vapnik-Chervonenkis codimension 1"
- Sylvy Anscombe. "Shelah's Conjecture and Johnson's Theorem"
- Christian d'Elbée and Yatir Halevi. "Dp-minimal integral domains"
- Christian d'Elbée, Yatir Halevi, and Will Johnson. "The classification of dp-minimal integral domains"

- Alfred Dolich and John Goodrick. “Tame topology over definable uniform structures”
- Vince Guingona. “On VC-minimal fields and dp-smallness”
- Franziska Jahnke, Pierre Simon, Erik Walsberg. “Dp-minimal valued fields”
- Will Johnson. “The classification of dp-minimal and dp-small fields”
- Will Johnson. “Visceral theories without assumptions”
- Alf Onshuus and Alexander Usvyatsov. “On dp-minimality, strong dependence, and weight”
- Bruno Poizat. *Stable Groups*
- Atticus Stonestrom. “On non-abelian dp-minimal groups”
- Alexander Usvyatsov. “On generically stable types in dependent theories”
- Frank Wagner. “Dp-minimal groups”

Computable Structure Theory

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This course will be an overview of computability-theoretic and definability-theoretic perspectives on countable first-order structures. A central theme will be the distinction between internal properties, determined by the isomorphism type of a structure, and external properties, revealed through the computability-theoretic analysis of its presentations. We will employ computability-theoretic constructions, arithmetic forcing, the understanding of the types realized in countable models, and tools from effective descriptive set theory.

Nairian Models

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Nairian models introduced by Blue, Larson, and Sargsyan are ZF models generalizing the Chang Model and which are obtained from LSA models of the Axiom of Determinacy (more precisely from AD+ models). These models have many interesting properties and provide a new source of ground models for obtaining independence results in ZFC. We will survey the background material with the goal of proving an upper bound on the large cardinals which can exist in (full) Nairian models. This is relevant to the Ultimate L Program.

The subject of Nairian models combines descriptive set theory in the context of AD, fine-structure theory from the Inner Model Program, and Cohen's method of forcing.