V5A7 - ADVANCED TOPICS IN MATHEMATICAL LOGIC (SOSE 2022-23) NEOSTABILITY AND INDEPENDENCE RELATIONS

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Links. Link for basis here.

Lectures.

- **Tuesday: 14:00 (c.t.)– 16:00** Wegelerstr. 10 - Kleiner Hörsaal
- **Wednesday 12:00 (c.t.) – 14:00** Endenicher Allee 60 - SemR 0.006

Abstract. The course will introduce the fruitful links between model theory and a combinatoric of sets given by axiomatic independence relations. One of the main goals of this course is to get familiar with the so-called *forking calculus*, which consists of a model-theoretic abstraction of arguments from 'elementary' algebraic geometry and field theory to a general level. We will cover the Kim-Pillay theorem (the characterisation of simple theories by the presence of a well-behaved independence relation), the Harnik-Harrington principle (similar but for stable theories), and few steps into the wider classes of NSOP_1 and NSOP_4 theories. We will also cover some results purely about axiomatic theory of independence, such as Adler's "theorem of symmetry". We will illustrate the abstract results by concrete examples which we will study all along the course: algebraically closed fields, generic predicate on a field, generic automorphisms of fields (ACFA), random graphs, and PAC fields.

Prerequisites. Basic level in model theory. Notions of formulas, types, saturated models, and extraction of indiscernible sequences will be essential for this course and will be covered. Participation in the course Advanced Mathematical Logic during the WS 2021/22 is helpful, but not compulsory. Participation in the course Advanced Mathematical Logic II (V4A8) WS 2022/23 will not be especially helpful, since arguments will be of a more combinatorial and algebraic nature.

Literature. Main inspirations for the course: [Cas11], [TZ12].

References

[Cas11] Enrique Casanovas. *Simple theories and hyperimaginaries*, volume 39 of *Lecture Notes in Logic*. Association for Symbolic Logic, Chicago, IL; Cambridge University Press, Cambridge, 2011.

[TZ12] Katrin Tent and Martin Ziegler. *A course in model theory*, volume 40 of *Lecture Notes in Logic*. Association for Symbolic Logic, La Jolla, CA; Cambridge University Press, Cambridge, 2012.