

INTRODUCTION TO GEOMETRIC STABILITY THEORY
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Description. Motivated by Morley’s categoricity theorem and a conjectured generalization for the possible number of uncountable models of first-order theories, Shelah isolated the important class of stable theories and developed a rich machinery for analyzing models and definable sets for this class. Later work by Zilber, Cherlin, Hrushovski, Pillay and others demonstrated that notions and methods of stability have strong geometric content (“geometry of forking”), elucidated the fact that understanding algebraic structures such as groups and fields definable in a structure is crucial even for purely model-theoretic questions (e.g. in the study of totally categorical theories), and found multiple applications in some of the more traditional branches of mathematics such as algebra and number theory.

The aim of this course is to provide an introduction to geometric stability. We will discuss the following topics: Morley’s categoricity theorem, Shelah’s classification, stable theories, forking independence, strongly minimal theories and pregeometries, local modularity and related notions, Zilber trichotomy, group and field configurations, totally categorical theories, connections to combinatorics.

As a preparatory reading, I suggest “Model Theory: An Introduction” by David Marker, in particular the later chapters are relevant for some of the material we will discuss in the course. For more advanced topics, see “Geometric stability theory” by Anand Pillay.