Frontiers in Diophantine Geometry
(advisor: Lars Kühne)

Introduction: Since antiquity, mathematicians have endeavored to determine the integral solutions of Diophantine equations (i.e., polynomial equations with integer coefficients). Remarkable results in this area include the theorem of Matiyasevich on Hilbert's tenth problem, the theorem of Faltings on the finiteness of rational points on curves of genus ≥ 2, and Wiles's proof of Fermat's Last Theorem.

Diophantine geometry emerged as a geometric approach to Diophantine equations in the last half of the last century but has since given rise to its own set of open research problems. Within diophantine geometry, significant progress has been made recently on questions of uniformity and unlikely intersections. Furthermore, connections with the nascent field of arithmetic dynamics have become more prominent in the last ten years.

Research Topics: Research will center around open problems in Diophantine geometry, particularly with a view towards arithmetic dynamics, Arakelov geometry, transcendence theory, and unlikely intersections. A concrete topic will be worked out during the first year, while the candidate receives further training.

Keywords: arithmetic dynamics, Bogomolov conjecture, Diophantine geometry, heights, unlikely intersections