Research Statement

by Dominik Adolf

I'm interested in a diverse array of set-theoretic subjects, including large cardinals, forcing and generic ultrapowers. I try to focus on inner model theory though.

Most of the last two years I spend on studying the core model induction. This is a techique used to compute lower bounds for consistency strength, applicable to a wide range of statements, say from pcf-theory (see [1]) or forcing axioms (see [2]).

The first step in any core model induction is the closure of the universe under $M_n^\#$ for every natural number n, i.e. there exists for every set X a mouse built over X and containing n woodin-cardinals bigger than the rank of X. To obtain this we utilize the K-existence dichotomy, which broadly states, that, assuming the closure of the universe under $M_n^\#$ for some n, either the universe is closed under $M_{n+1}^\#$ or for some set X the core model over X exists.

The next step is to show the mouse capturing condition W_α^* for all ordinals α. W_α^* states, that for any set of reals $U \in J_\alpha(\mathbb{R})$, such that both U and it's complement admit scales in $J_\alpha(\mathbb{R})$, any real x and any natural number n, there exists a mouse containing x and n woodins that "captures" U. It is an elementary fact, that W_α^* for all α yields $AD^{L(\mathbb{R})}$.

At the moment I'm working on extending the result from [4]. We already have a partial result, but I'm positive that the hypotheses actually yield $AD^{L(\mathbb{R})}$.

Furthermore I'm writing on a paper together with Peter Koepke. We are looking for forcings, that function like Namba-forcing, but on cardinals bigger than $\aleph_2$. Say you have some big cardinal κ and some regular $\nu < \kappa$. Does there exist a forcing $\mathbb{P}$, which changes the cofinality of κ^+ to ν, without touching cardinals below κ^+? We managed to compute the consistency strength of this statement to be a measurable cardinal $> \kappa$, that has Mitchell-order at least η, where η is such that $\omega \cdot \eta = \nu$, if κ is regular. (The consistency strength for singular κ is one Woodin cardinal.)

Furthermore I'm interested in any application of the stacking mice method introduced here: [3]

References

[1] M. Gitik, S. Shelah, R. Schindler, *Pcf theory and Woodin cardinals*, Lecture Notes in Logic **27** (2006) 172 – 205

[2] J. Steel, S. Zoble, *Determinancy from strong reflection*, preprint.

[3] R. Jensen, E. Schimmerling, R. Schindler, J. Steel, *Stacking Mice*, Journal of Symbolic Logic **74** (2009) 315–335.

[4] B. Claverie, R. Schindler, *Woodin's axiom* $(*)$*, bounded forcing axioms, and precipitous ideals on* ω_1, preprint.