

Report for a Short Visit Grant

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I visited Vienna as part of the ESI workshop on large cardinals and descriptive set theory in Vienna from 14 to 26 June 2009. As part of the workshop, four talks were given that related to my research: a talk by my PhD student Daisuke Ikegami about joint work on Real Blackwell Determinacy; a talk by my co-author Joel Hamkins on our joint work on modal logics of forcing constructions; a talk by my co-author Steve Jackson on our paper in which we prove new partition properties from AD; and my own talk on eventually different forcing.

1. *Real Blackwell Determinacy*. During Ikegami's talk, Hugh Woodin made suggestions to get better lower bounds for the consistency strength of $\text{Bl-AD}_{\mathbb{R}}$. Ikegami discusses these ideas in more detail in his ESF-Report.
2. *Modal logics of forcing constructions*. As opposed to our original plan, we did not work on the joint paper on modal logics of collapse forcings (this work was postponed to my New York visit in September and October), but instead worked on the bi-modal logic of forcing and grounds. Previous work was extended. Again, it was a remark by Hugh Woodin which led to some further results. We had a meeting with Mack Stanley and Sy Friedman to discuss open questions in the modal logic of class forcing. Friedman managed to solve a number of questions that we had in the area of set-theoretic geology.
3. *Combinatorics of the first three uncountable cardinals without the Axiom of Choice*. I collaborated with Apter and Jackson to extend the results of our joint paper. We managed to get a few infinitary patterns (e.g., the pattern $\text{cf}(\aleph_1) = \aleph_1$, $\text{cf}(\aleph_2) = \aleph_2$, and $\text{cf}(\aleph_n) = \aleph_3$ (for $n \geq 3$)) and started to work on the question of dealing with patterns that include supercompactness. Jackson and I found the time to rework our paper on canonical measure assignments.
4. *Regularity properties at the second level of the projective hierarchy*. Discussions with my student Ikegami led to some applications of the absoluteness analyses at higher levels to set

theory of the reals. In addition Brendle and I included some referee comments into our paper that resulted in the proof of one of the mentioned conjectures. (For this, the presence of Zapletal at the workshop was crucial.)