Research Statement

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I am a second year Ph.D. student in University of Amsterdam and my supervisor is prof. Jouko Väänänen. The topic of my research is second order logic. The basis of my work is the following result of Ajtai[1] : It is independent of ZFC whether all second order equivalent countable models are isomorphic.

My best result so far is generalization of Ajtai's result to arbitrary successor cardinals using second order strengthenings of infinitary languages $L_{\kappa^+,\omega}$.

Using the idea of Ajtai's proof can be proved that if there is second (or respectively third, fourth...) order definable well-order of the reals, then all second (or respectively third, fourth...) order equivalent countable models are isomorphic. That is why I am interested in second order definable well-orders of the reals. Recently I have studied which large cardinals are consistent with second order definable well-orders of the reals.

When Ajtai proves that in L all second order equivalent countable models are isomorphic, he uses heavily the second order definable well-order of the reals in L. It would be interesting to know if there is a model of ZFC with

1. There is no second order definable well-order of the reals.

2. All second order equivalent countable models are isomorphic.

References

[1] Ajtai, M. *Isomorphism and Higher Order Equivalence* Annals of Mathematical Logic 16 181-203 (1979).