

Research Statement

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Much of my research belongs to the general area of building canonical inner models for large cardinals and exploring the connections between inner model theory and descriptive set theory. I have been mainly occupied with proving the *Mouse Set Conjecture* (MSC), which is one of the central open problems of the two aforementioned areas of set theory. In my thesis, I developed the theory of hod mice which I used to prove some instances of MSC and applying the theory of hod mice to a more general setting with a goal of solving MSC is part of my future research plans. The main importance of MSC is that it can be used to obtain partial results on the *inner model problem*. The resolution of MSC will also increase the power of the *core model induction*, which is a very successful technique, due to Woodin, for evaluating lower bounds of the consistency strengths of various statements. I am also interested in other applications of the theory of hod mice. Examples of such applications are determining the consistency strengths of 1. the existence of *divergent models of AD* 2. the theory $\text{AD}_{\mathbb{R}} + \text{“}\theta \text{ is regular”}$ 3. $\neg \square_{\kappa}$ where κ is a singular strong limit cardinal and etc.

I have also worked on some questions of pure descriptive set theory that can be answered using techniques from inner model theory. One such question concerns the lengths of $\mathcal{D}^k(\omega \times n - \Pi_1^1)$ prewellorderings. Outside descriptive set theory and inner model theory, I have worked in the area of large cardinals and forcing where I have been primarily working on problems surrounding the *identity crisis* phenomenon. My main contribution is a new way of forcing indestructibility for strong compactness that can be used to show the identity crisis type of results while maintaining some form of Laver indestructibility for the strongly compacts.