My main interests lie in the interplay of set theory and other branches of mathematics, specifically algebra, topology, ergodic theory. More precisely:

My diploma thesis dealt with bounding the height of automorphism towers. Given a Group G with trivial center, its automorphism Group $Aut(G)$ has trivial center as well. Furthermore there exists a natural embedding from G to $Aut(G)$ mapping an element $g \in G$ to the conjugation with g. By identifying G with its image under that embedding, setting $G_0 = G$ and $G_1 = Aut(G)$ and iterating this process while setting $G_\alpha = \bigcup_{\gamma<\alpha} G_\gamma$ at limit stages, we obtain an ascending chain of groups, the automorphism tower of G.

If $\alpha \in \mathbf{On}$ is minimal with $G_\alpha = G_{\alpha+1}$ we call α the height of the automorphism tower of G (denoted τ_G). Let τ_κ be the least upper bound for the height of automorphism towers of groups with cardinality κ. Itay Kaplan and Saharon Shelah showed that in ZF $\tau_\kappa < \theta_{\mathcal{P}(^{<\omega}\kappa)}$, where $\theta_{\mathcal{P}(^{<\omega}\kappa)}$ denotes the minimal ordinal such that there is no surjection from $\mathcal{P}(^{<\omega}\kappa)$ to it. In the presence of AC this results in the well-known inequality $\tau_\kappa < (2^\kappa)^+$. Itay Kaplan and Saharon Shelah showed also that $(\tau_\kappa)^{V'} = (\tau_\kappa)^V$ for a transitive class model $V' \subseteq V$ of ZF with $\mathcal{P}(\kappa) \in V'$. On the other hand following an approach of Winfried Just, Saharon Shelah and Simon Thomas one can use forcing to show that the bound $\tau_\kappa < (2^\kappa)^+$ is the best cardinal bound provable in ZFC.

I'm still interested in questions concerning the function that maps κ to τ_κ or if better bounds are provable once you restrict yourself to certain classes of groups, however in the recent months, i.e. since I am a PhD student, my main focus has lain on descriptive set theory, particularly the theory of definable/Borel equivalence relations on Polish spaces. This yields applications to classification problems in ergodic theory, since given a standard measure space (X, μ) (any such space is isomorphic to the interval $[0, 1]$ with the Lebesgue measure) and a measure preserving (or ergodic) transformation T the orbit equivalence relation E_T, where for $x, y \in X$ xE_Ty iff there exists an $n \in \mathbb{Z}$ such that $x = T^n(y)$, is a Borel equivalence relation. The study of those equivalence relations is linked to the study of Borel actions of countable groups on Polish spaces, which is an interesting area on its own.