Research statement

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I am a first year PhD student at Eötvös Loránd University, Budapest. My supervisor is Márton Elekes.

My main interest is effective and classical descriptive set theory, set theory, forcing, and real analysis.

In my MSc Thesis I have generalized a method of A. W. Miller [2] concerning the consistency of the existence of certain coanalytic subsets of the reals (e.g. MAD families, 2-point sets, Hamel bases, etc). The main result is basically that a transfinite construction with a 'nice' selection algorithm and sufficiently large freedom of choice can be carried out in $V = L$ so that it produces a coanalytic set [3].

Presently I am also interested in various versions of the following 'unique representation' problem raised in [1]:

Problem. Is there a Borel subset B of $\omega^\omega \times \omega^\omega$ such that for every $A \in K_\sigma$ there exists a unique $x \in \omega^\omega$ for which $B_x = A$ and for every $x \in \omega^\omega$ $B_x \in K_\sigma$?

The answer is known to be consistently no, but what can we say in ZFC? This problem is closely related to finding a 'natural' Polish structure on the K_σ subsets of ω^ω.

References

[1] Gao, Su; Jackson, Steve; Laczkovich, Miklós; Mauldin, R.Daniel On the unique representation of families of sets. *Trans. Am. Math. Soc.* 360, No. 2, 939-958 (2008).

[2] A. W. Miller, Infinite combinatorics and definability. *Ann. Pure Appl. Logic* 41 (1989), no. 2, 179-203.

[3] http://www.cs.elte.hu/∼ vidnyanz/c(2).pdf