RESEARCH STATEMENT

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I am working on applications of set theory in topological dynamics. In [5], the authors established a connection between structural Ramsey theory and dynamics of closed subgroups of S_∞, the group of permutations on a countable set. These correspond to groups of automorphisms of countable ultrahomogeneous structures and general results in [5] show that an automorphism group of an ultrahomogeneous countable relational structure fixes a point under any action on a compact Hausdorff space (i.e. it is *extremely amenable*) if and only if the class of its finite substrutres satisfies the Ramsey property. This enabled to indentify universal minimal flows of groups of automorphisms of many ultrahomogeneous structures. Using ultrafilter dynamical system, I have been able to prove this connection for uncountable structures [2], [1].

The ultrafilter dynamical system also brings us to a forgotten description of the gratest ambit (see [6]), that can be simply transferred to a new description of a universal minimal system. Many properties of dynamical system have an easy translations into this language and some old proofs become easy observations, e.g. extreme amemability of groups of isometries of generalized Urysohn spaces.

My goal is to further study both the ultrafilter dynamical system and the Ramsey properties. Along the lines of [4], I am studying general properties of the univeral minimal system in the language of ultrafilters as it was done for discrete (semi)groups. On the Ramsey side, I am on the way to explore big Ramsey digrees in connection with Ramsey statemements of the form similar to Devlin's theorem ([3]): For every positive integer k there is a positive integer t such that

$$\mathbb{Q} \to (\mathbb{Q})^k_{l,t}$$

for all positive integers l, i.e. any colouring of k-tuples of $\mathbb{Q}$ with l colours admits a copy of $\mathbb{Q}$ whose k-tuples take on at most t colours.

References

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[4] Neil Hindman and Dona Strauss. *Algebra in the Stone-Čech compactification*, volume 27 of *de Gruyter Expositions in Mathematics*. Walter de Gruyter & Co., Berlin, 1998. Theory and applications.

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