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Research Statement

I am interested in descriptive set theory and definable proper forcing. One of the recent directions here is the canonization of analytic equivalence relations. Given a class of analytic equivalence relations $\mathbf{E}$ on a Polish space X, a σ-ideal I on X and a finite set of equivalence relations $F_1, \ldots, F_n$ on X we say that $\mathbf{E}$ *canonizes to* $F_1, \ldots, F_n$ *on* I*-positive Borel sets*, in symbols

$$\mathbf{E} \underset{I}{\rightarrow} F_1, \ldots, F_n$$

if for every Borel I-positive set $B \subseteq X$ and any equivalence relation $E \in \mathbf{E}$ there is an I-positive Borel set $C \subseteq B$ such that $E \restriction C = F_i \restriction C$ for some $i \leq n$.

If the finite set $F_1, \ldots, F_n$ contains just two trivial equivalence relations (identity and everything), then we say about *total canonization.* For example, Silver's dichotomy gives total canonization for $\mathbf{E}$ being the class of all Borel equivalence relations and I the σ-ideal of countable sets. For other σ-ideals, e.g. connected to a probability measure or topological dimension, the canonization will also be true although may require new techniques. For some other σ-ideals, e.g. the smooth ideal, canonization may take more complicated form, including more than just the two trivial equivalence relations, or restricting the class of equivalence relations to those below E_{K_σ} or classifiable by countable structures.

This theory is the subject of my forthcoming book with Vladimir Kanovei and Jindra Zapletal [1].

References

[1] Kanovei V., Sabok M., Zapletal J.*Canonical Ramsey Theory on Polish Spaces*, Cambridge Tracts in Mathematica, CUP, to appear.