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Structurable equivalence relations, Borel combinatorics, and countable model theory

The theory of countable Borel equivalence relations (CBERs) provides a global framework for discussing and comparing all locally countable Borel combinatorics problems (graph colorings, group actions, etc.) at once. We present a result showing that in a precise sense, all such combinatorial problems on CBERs can be reduced to syntactic definability problems in the infinitary logic $\mathcal{L}_{\omega_1\omega}$ on countable structures. This provides a rigorous explanation of a well-known heuristic in Borel combinatorics, that many arguments amount to "doing countable combinatorics in a uniformly Borel way", while also allowing finer distinctions to be made between different classically equivalent combinatorial problems. This talk is based on joint works with Alexander Kechris and Rishi Banerjee.