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Approximating Hausdorff Measures

This talk involved a few topics and questions in which Hausdorff measures and dimensions play a role. First, it appears to be still an open question as to whether these are $F\sigma$ subfields (or subrings) of the real numbers of dimensions larger than 0. Subgroups of any dimension s with $0 \leq s \leq 1$ and s-measures 0, in the case $0 < s \leq 1$, or s-measures ∞, in the case $0 \leq s < 1$, were constructed, for example in [1] using restrictions on the decimal expansions of numbers. In [2] it was shown that closed sets F of dimension s exist which satisfy for each $x, y \in F, \frac{1}{2}(x + y) \notin F$. Other algebrais combinations involving Hausdorff measure remain to be considered.

Secondly, the question of non-measurability of sets in Hausdorff m_δ^s measures was discussed. It seems clear from examples that every closed set of n-dimensional measure 0 in $\mathbf{R}^n$ is not m_δ^s measurable for $s < n$ and $\delta > 0$ unless its m_δ^s measure is 0. Proofs of this might involve further insight into the structure of sets of fractional measure.

Thirdly, some observations concerning the Cantor singular function (namely, that it satisfies a Lipschitz condition of order