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Projections of self-affine fractals

If a subset X of Rd is projected onto a linear subspace then the Hausdorff
dimension of its image is bounded above by the rank of the projection and by the dimension of the set X itself. When the Hausdorff dimension of the image is smaller than both of these values the projection is called an exceptional projection for the set X. By the classical theorem of Marstrand, the set of exceptional projections of a Borel set always has Lebesgue measure zero when considered as a subset of the relevant Grassmannian. I will describe some results from an ongoing systematic study of the exceptional projections of self-affine sets describing, among others, a mechanism to create exceptional projections. As an application, we will discuss an example of a strongly irreducible self-affine set in R4 whose set of exceptional projections includes a nontrivial subvariety of the Grassmannian. Ongoing joint work with Ian Morris.