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Quantifications of the Besicovitch Projection theorem in a nonlinear setting.

There are many classical results relating the geometry, dimension, and measure of a set to the structure of its orthogonal projections. It turns out that many nonlinear projection-type operators also have special geometry that allows us to build similar relationships between a set and its “projections,” just as in the linear setting. We will discuss a series of recent results from both geometric and probabilistic vantage points. In particular, we will see that the multi-scale analysis techniques of Tao, as well as the energy techniques of Mattila, can be strengthened and generalized to projection-type operators satisfying a transversality condition. As an application, we find upper and lower bounds for the rate of decay of the Favard curve length of the four-corner Cantor set. (Received January 25, 2022)