1145-60-622 **Benjamin D Schweinhart*** (schweinhart.2@osu.edu), Ohio State University, Mathematics Tower, 231 W 18th Ave, Columbus, OH 43210. *The Persistent Homology of Random Geometric Complexes on Fractals.*

We study the asymptotic behavior of the persistent homology of i.i.d. samples from a d-Ahlfors regular measure on a metric space — one that satisfies uniform bounds of the form

$$\frac{1}{c}\, r^d \leq \mu\big(B_r(x)\big) \leq c\, r^d$$

for all sufficiently small r and all x in the support of μ, where d can be any positive real number. Our main result is that if $x_1, \dots x_n$ are sampled from a d-Ahlfors regular measure on a metric space and $E_\alpha(x_1, \dots, x_n)$ denotes the α-weight of the minimal spanning tree on $x_1, \dots, x_n$:

$$E_\alpha(x_1, \dots, x_n) = \sum_{e \in T(x_1, \dots, x_n)} |e|^\alpha$$

then

$$E_\alpha(x_1, \dots, x_n) \approx n^{\frac{d-\alpha}{d}}$$

with high probability as $n \to \infty$, where the symbol $\approx$ denotes that the denotes that the ratio between the two quantities is bounded between two positive constants.

We prove similar results about the asymptotic behavior of weighted sums defined in terms of higher-dimensional persistent homology, under more restrictive hypotheses. As an application, we show that the fractal dimension of a measure can be computed from the persistent homology of i.i.d. samples from that space, in a manner similar to that proposed in the experimental work of Adams et al. (Received September 11, 2018)