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Characterizing rare events in persistent homology.

Indecomposables obtained through decompositions of persistent homology are regarded as topological summary of real data. However, as is well known, there exist pathologically complicated indecomposables in multi-parameter persistent homology in purely algebraic setting, and this fact makes it difficult to build mathematical theory on that setting. Our fundamental question is, how much should we care about such complicated indecomposables in the real data, and what is a suitable framework to study this question? To this aim, we will show several ongoing results, especially, (1) large deviation principle on 1 parameter persistent homology, and (2) law of large numbers on multi-parameter persistent homology. Then we will discuss how these two results (partially) answer to the original question. (Received September 10, 2020)