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Yuriy Mileyko* (ymileyko@lavabit.com), Coordinated Science Laboratory, 1308 West Main St., Urbana, IL 61801, and **John Harer**. *Reincarnations in persistent homology with application to shape skeleta*.

The theory of persistent homology relies heavily on the existence of birth-death decompositions of persistence modules. The latter are sequences of vector spaces (indexed by integers or real numbers) connected by linear maps. It is important to note that the existence of the birth-death decomposition is indifferent to the fact that a persistence module typically represents the (co)homology of a sequence of nested spaces, which is often obtained by using excursion sets of a continuous function. In this talk we show that by employing exact sequences and cap/cup products in homology and cohomology we can create an additional structure on top of the birth-death decompositions which relates deaths of (co)homology in one dimension with births in a different dimension. This leads to the concept of a reincarnation. We show that reincarnations can be very useful when studying excursion sets of a family of functions. In particular, we use reincarnations to provide an alternative definition of the medial axis, curve skeleton, and even higher order skeleta. (Received September 03, 2012)