Given a point cloud P representing a dataset in Euclidean space, one of the questions that can be raised is how to identify all the "patterns" that contribute to its shape. Persistent homology looks at this question by gradually raising a simplicial complex between elements in P, and then computing the homology at each level of this construction. This way, we can look at every homology class as having a "lifetime" (given by a birth and death), written as a barcode. Longer barcodes correspond to more distinguishable patterns in data P, while brief barcodes correspond to artifacts in P.

Typically, P is sampled from the Euclidean space. If we can embed P into a space with a more intricate topology (like a torus), then the barcodes in this scenario can be associated to extra information inherited from the topology of the containing space. In this presentation, we will look at a few sets of experimental data. Applying persistent homology, we will see how the barcodes for each set are computed, how we associate extra features, and how barcodes with certain such features can be compared. This could be used to evaluate a hypothesis that has been raised on these data sets.