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Vasileios Maroulas* (vmaroula@utk.edu), 1403 Circle Dr., Knoxville, TN 37996, and **Farzana Nasrin** and **Christopher Oballe**. *A Bayesian Framework for Persistent Homology*.

Persistence diagrams offer a way to summarize topological and geometric properties latent in datasets. While several methods have been developed that utilize persistence diagrams in statistical inference, a full Bayesian treatment remains absent. This talk, relying on the theory of point processes, presents a Bayesian framework for inference with persistence diagrams relying on a substitution likelihood argument. In essence, we model persistence diagrams as Poisson point processes with prior intensities and compute posterior intensities by adopting techniques from the theory of marked point processes. We then propose a family of conjugate prior intensities via Gaussian mixtures to obtain a closed form of the posterior intensity. Finally we demonstrate the utility of this Bayesian framework, packaged in R under BayesTDA, with a classification problem in materials science using Bayes factors. (Received September 13, 2019)