1135-51-1368 **Osman B Okutan*** (okutan.1@osu.edu), 100 Math Tower, 231 West 18th Avenue, Columbus, OH 43210, and **Facundo Memoli** (memoli@math.osu.edu). *Approximating metric spaces with Reeb type graphs.*

Every length space can be approximated by graphs under the Gromov-Hausdorff distance. However, as the approximation gets better and better, the graphs can get quite complicated, more precisely their genus (i.e. the first Betti number) can go to infinity. We study how well can we approximate the original space (in the Gromov-Hausdorff sense) if we put restrictions on the genus of the graph. Reeb type constructions produce graphs with bounded genus or even sometimes trees. Here we consider how to approximate length spaces with Reeb type graphs and trees. We also consider how similar type of ideas can be adapted to the finite setting.

In particular, we prove that the Gromov-Hausdorff distance between a compact Riemannian manifold and a Reeb graph of certain functions defined on the manifold can be bounded in terms of the volume, the first Betti number and a novel invariant that we call *thickness*. We also obtained a tree approximation result for metric graphs where the upper bound can be written in terms of the genus and the hyperbolicity of the original graph. Here we observed a connection to the finite setting through poset theoretic ideas. (Received September 21, 2017)