1135-62-1769 **Eddie Aamari*** (eaamari@ucsd.edu), Department of Mathematics, University of California, San Diego (UCSD), 9500 Gilman Drive # 0112, La Jolla, CA 92093, and **Jisu Kim**, **Frédéric Chazal**, **Bertrand Michel**, **Alessandro Rinaldo** and **Larry Wasserman**. *Estimating the Reach of a Manifold.*

Various problems within computational geometry and manifold learning encode geometric regularity through the so-called reach, a generalized convexity parameter. The reach τ_M of a submanifold $M \subset \mathbb{R}^D$ is the maximal offset radius on which the projection onto M is well defined. The parameter τ_M renders a certain minimal scale of M, giving bounds on both maximum curvature and possible bottleneck structures. In this talk, we will study the geometry of the reach through an approximation perspective. We will present new geometric results on the reach of submanifolds without boundary. An estimator $\hat{\tau}_n$ of τ_M will be described, in an idealized i.i.d. framework where tangent spaces are known. The estimator $\hat{\tau}_n$ is showed to achieve uniform expected loss bounds over a $\mathcal{C}^3$-like model. Minimax upper and lower bounds are derived. We will conclude with an extension to a model in which tangent spaces are unknown. (Received September 24, 2017)