

**Résumé:**

We examine the estimation of a signal embedded in white noise on a compact manifold. A sharp asymptotic minimax bound is determined under the sup-norm risk over Holder classes of functions and generalizes similar results available for spheres in various dimensions. The estimation allows for the development of a statistical Morse theory using the level sets of the estimated function and together with the sup-norm bound allows the bounding of the Hausdorff distance in a persistence diagram in computational algebraic topology.