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Tubes and Steklov eigenvalues in negatively curved manifolds

In this talk, we establish a tubular neighborhood theorem for embedded closed totally geodesic hypersurfaces in a negatively curved manifolds of dimension $n \geq 3$ extending Basmajian's result in 1994 in the hyperbolic setting. We then consider the Steklov eigenvalue problem on compact pinched negatively curved manifolds with totally geodesic boundaries. We show that the first nonzero Steklov eigenvalue is bounded below in terms of the total volume and boundary area when the dimension is at least three. In particular, it shows that Stelov eigenvalues can only tend to zero when the total volume and/or boundary area go to infinity. It can be seen as a counterpart of the lower bound for the first nonzero Laplace eigenvalues on closed pinched negatively curved manifolds of dimension at least three as proved by Schoen in 1982. We provide examples showing that the dependency on both volume and boundary area is necessary. This is a joint work with Ara Basmajian, Asma Hassannezhad and Antoine Métras.