



Colloquium

March 12, 3:00 p.m. (8th Period)
(in the Atrium)

Speaker: Sucharita Mallick

Title: Homotopy Connectivity of Cech Complexes of Spheres

Abstract

Let S^n be the n -sphere with the geodesic metric. The intrinsic Cech complex of S^n at scale r is the nerve of all open balls of radius r in S^n . In this talk, we will show how to control the homotopy connectivity of Cech complexes of spheres as the scale varies over $(0, \pi)$, in terms of coverings of spheres. Our upper bound on the connectivity, which is sharp in the case $n=1$, comes from the chromatic numbers of Borsuk graphs of spheres. Our lower bound is obtained using the conicity (in the sense of Barmak) of Cech complexes of the sufficiently dense, finite subsets of S^n . These bounds imply that for $n > 1$, the homotopy type of the Cech complex of S^n at scale r changes infinitely many times as r varies over $(0, \pi)$. Additionally, we will lower bound the homological dimension of Cech complexes of finite subsets of S^n , in terms of their packings. This is joint work with Henry Adams and Ekansh Jauhari.