

## *Graduate Student Seminar*

Speaker: Allegra Berliner

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In basic topology it is common to introduce simplicial homology first, where one measures information about a topological space (often a manifold) by thinking of it as a simplicial complex and making a combinatorial calculation. While homology calculations are well-defined up to simplicial subdivisions, one might wonder further if a homeomorphism between two simplicial complexes  $K$  and  $L$  is homotopic to a simplicial isomorphism of subdivisions of  $K$  and  $L$ . This conjecture, called the Polyhedral Hauptvermutung, was proved false in high dimensions (dimensions 5 and higher) by Milnor in the sixties, but the counterexamples originally drawn up were among simplicial complexes that were not manifolds. One might ask next whether for a certain class of manifolds with compatible simplicial structure (PL manifolds), might the Hauptvermutung be true? This question is the Manifold Hauptvermutung, which was also proved false by Kirby and Siebenmann. However, the significance is that in the case of manifolds, the disproof led to the development of an invariant that could detect PL structures on topological manifolds, and to subsequent classification of these structures when they exist.