

Topics in Algebraic Topology

Supervisor: Alexander Berglund

I work in algebraic topology and its interactions with neighboring fields such as homological algebra and differential topology. Interest in one or more of the following broad topics could serve as an entry point to a PhD project supervised by me:

Algebraic topology

(cohomology and homotopy groups, algebraic models for spaces, rational homotopy theory)

Differential topology

(manifolds, fiber bundles, characteristic classes)

Homological algebra

(minimal resolutions, group cohomology, Hochschild and cyclic homology, Koszul algebras)

Operads and higher algebra

(A-infinity and L-infinity algebras, cyclic and modular operads, graph complexes)

My most recent research focuses on applications of rational homotopy theory to the study of spaces of automorphisms of manifolds and characteristic classes for fibrations and manifold bundles. A look at the papers listed below should give an idea of what kind of mathematics is involved. Feel free to contact me if you would like to learn more.

[1] A. Berglund, T. Zeman, Algebraic models for classifying spaces of fibrations, arXiv:2203.02462 [math.AT].

[2] A. Berglund, Characteristic classes for families of bundles, *Selecta Math. (N.S.)* 28 (2022), Paper No.51, 56 pp.

[3] A. Berglund, I. Madsen, Rational homotopy theory of automorphisms of manifolds, *Acta Math.* 224 (2020), no. 1, 67–185.