

# Calculating the stable homology of families of configuration spaces and other moduli spaces

Series of talks at [IMAR](#) // [Martin Palmer-Anghel](#) // 2019

## Abstract for the series:

This will be a mostly expository series of talks on the stable homology of moduli spaces, in a variety of different contexts. There are many interesting situations where one has a sequence of moduli spaces of some kind, indexed by the natural numbers (for example: configuration spaces of  $n$  points in a manifold, moduli spaces of surfaces of genus  $g$ , moduli spaces of branched coverings with  $n$  branch-points, etc). One very successful 2-step strategy for understanding the homology of such sequences of moduli spaces is

- (1) to prove that the homology of the sequence *stabilises*, and then
- (2) to calculate the direct limit of the homology of the sequence.

Often, this direct limit (the *stable homology*) is approachable with the tools of algebraic topology, whereas the homology of the individual moduli spaces is intractable, except in some exceptional or low-degree cases. Together, these two steps compute the homology of the moduli spaces in the *stable range*, i.e. the range of degrees in which homological stability from part (1) holds. As the title suggests, these talks will focus on part (2) of this strategy, i.e. *calculating the stable homology*.

The contexts that I plan to discuss (in varying levels of detail) during the series include:

- (a) Unordered configuration spaces on manifolds.
- (b) Oriented configuration spaces (with a detour into the *group-completion theorem*).
- (c) Mapping class groups of orientable or non-orientable surfaces.
- (d) Diffeomorphism groups of higher-dimensional analogues of orientable surfaces.
- (e) Automorphism groups of free groups (including for homology with twisted coefficients).
- (f) Configuration-mapping spaces, including moduli spaces of branched coverings of the 2 disc.
- (g) Moduli spaces of manifolds with conical singularities.
- (h) Thompson groups and Jónsson-Tarski algebras.

## Schedule:

### I. Friday 22 March 2019 (at the [topology seminar](#) of [IMAR](#))

This talk will focus mainly on points (a) and (b) in the list above.  
A separate abstract for this talk is [here](#).

### II. Friday 26 April 2019 (at the [GeMAT](#) seminar, [IMAR](#))

This talk will focus mainly on points (b) and (c) in the list above, continuing on from the first talk with more details of the *group-completion theorem* and outlining the ideas of a proof of the *Madsen-Weiss theorem*, in which the group-completion theorem is used.  
A separate abstract for this talk is [here](#).

### III. tbc

This talk will focus on point (c) in the list above, completing an outline of a proof of the Madsen-Weiss theorem (following Galatius-Randal-Williams).

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