

# On homological stability for homological representations of braid groups, surface braid groups and loop braid groups

Martin Palmer-Anghel // Talk at the topology seminar, IMAR, 31 January 2020

## Abstract.

This talk will be concerned with topologically-defined representations of the braid groups  $B_n$ , surface braid groups  $B_n(S)$  and the loop braid groups  $LB_n$ .

For example, there are well-known families of representations of  $\{B_n\}_{n \in \mathbb{N}}$ , parametrised by  $m \geq 1$ , the *Lawrence-Bigelow representations*  $\mathbb{L}_{m,n}$  (a particular case being the *reduced Burau representations*  $\mathbb{L}_{1,n}$ ). I will first describe how to construct analogous infinite families of representations  $\mathbb{L}_{m,n}^S$  and  $\mathbb{L}_{m,n}^{\text{loop}}$  for the surface braid groups and the loop braid groups, and how this fits into a general topological/homological construction of representations of any kind of *motion groups*.

These families of representations naturally extend to functors on certain categories having the corresponding motion groups as their automorphism groups; using this structure, I will prove that the twisted homology groups  $H_*(B_n; \mathbb{L}_{m,n})$  stabilise as  $n \rightarrow \infty$ , and similarly for  $H_*(B_n(S); \mathbb{L}_{m,n}^S)$ . (The analogous result for loop braid groups is work-in-progress.)

*This represents joint work with Arthur Soulié.*

*Preliminary version of our preprint: [arXiv:1910.13423v1](https://arxiv.org/abs/1910.13423v1).*