Mapping class group representations via Heisenberg, Schrödinger and Stone-von Neumann

Martin Palmer-Anghel // New York University, Abu Dhabi // 30 March 2022

Abstract.

One of the first interesting representations of the braid groups is the Burau representation. It is the first of the family of Lawrence representations, defined topologically by viewing the braid group as the mapping class group of a punctured disc. Famously, the Burau representation is almost never faithful, but the $k = 2$ Lawrence representation is always faithful: this is a celebrated theorem of Bigelow and Krammer and implies immediately that braid groups are *linear* (act faithfully on finite-dimensional vector spaces).

Motivated by this, and by the open question of whether mapping class groups are linear, I will describe recent joint work with Christian Blanchet and Awais Shaukat in which we construct analogues of the Lawrence representations for mapping class groups of compact, orientable surfaces. Tools include twisted Borel-Moore homology of configuration spaces, Schrödinger representations of discrete Heisenberg groups and the Stone-von Neumann theorem.

Based on joint work with C. Blanchet and A. Shaukat
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