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

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Abstract.

A long-standing open question about mapping class groups of surfaces is whether they are *linear*, i.e. act faithfully on finite-dimensional vector spaces. In genus zero, for the braid groups, the answer is yes, as proven by Bigelow and Krammer using one of the family of Lawrence representations of the braid groups.

Motivated by this, I will describe joint work with Christian Blanchet and Awais Shaukat in which we construct analogues of the Lawrence representations for higher-genus surfaces. A qualitative difference from the genus-zero setting is that our ground ring is non-commutative — the group ring of the discrete Heisenberg group — which enriches the representations but has the side effect that they are twisted. One way to untwist them involves the Schrödinger representation and the Stone-von Neumann theorem.

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