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Connes fusion of the free fermions on the circle

A conformal net on S^1 is an assignment $\mathcal{A} : \{\text{open subsets of } S^1\} \to \{\text{von Neumann algebras acting on } \mathcal{F}\}$, which satisfies a slew of axioms motivated by quantum field theory. In this talk, I will consider the free fermionic conformal net. In this case, the Hilbert space $\mathcal{F}$ is the Fock space generated by the positive energy modes of square-integrable spinors on the circle $L^2(S^1, \mathbb{S})$; and the von Neumann algebras are Clifford algebras generated by those elements of $L^2(S^1, \mathbb{S})$ whose support lies in $I \subset S^1$. After going over this construction, I will argue that given an open interval $I \subset S^1$, one can equip $\mathcal{F}$ with the structure of $\mathcal{A}(I)$-$\mathcal{A}(I)$-bimodule. I will then outline the construction of a canonical isomorphism of bimodules $\mathcal{F} \boxtimes_{\mathcal{A}(I_-)} \mathcal{F} \to \mathcal{F}$, where $\boxtimes_{\mathcal{A}(I_-)}$ stands for the Connes fusion product over the algebra assigned to the lower semi-circle I_-. If time permits, I will discuss some (anticipated) applications of this isomorphism, for example in string geometry, or in the construction of the free fermion *extended* topological field theory.