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Vector bundles on the moduli space of curves from representations of VOAs

Given any vertex operator algebra V , Zhu defined an associative algebra $A(V)$, and showed that to any $A(V)$ -module, one can associate an admissible V -module. This gives rise to a functor taking n -tuples of $A(V)$ -modules to a sheaf of coinvariants (and its dual sheaf of conformal blocks) on moduli spaces of Deligne-Mumford stable n -pointed curves. If V is strongly rational (in which case $A(V)$ is finite and semi-simple), much is known about these sheaves, including that they are coherent and satisfy factorization and sewing properties. Factorization and sewing allow one to show the sheaves are vector bundles with Chern classes in the tautological ring. In this talk I will describe a program in which we are aiming for analogous results after removing the assumption of rationality. As a first step, we replace the factorization formula with an inductive one that holds in case $A(V)$ is finitely generated. As an application, we show that if $A(V)$ is finite, the sheaves are coherent. This is new and ongoing joint work with Krashen and Damiolini, extending work with Damiolini and Tarasca.