

Abstract

Vertex operator algebras (VOAs) and their modules have been a focal point of research in both mathematics and physics. The prospect of a braided monoidal category structure on VOA-modules has long been awaited until a complete proof was first provided through a long series of papers by Huang-Lepowsky-Zhang. Despite its great importance, their proof is technically intricate and heavily reliant on complex analysis. This talk offers a more conceptual approach to understanding the monoidal category structure, leveraging recent advances in the algebro-geometric theory of conformal blocks. The ultimate goal is to establish a ribbon monoidal category structure on VOA-modules with minimal dependence on transcendental elements. As an initial achievement, we establish such a structure on modules of Zhu's algebra.