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Title: Tensor product theory for vertex operator algebra modules, and applications

Abstract: As in the theory of Lie algebras, the representation theory of vertex operator algebras has many applications. In contrast with the situation in Lie algebra theory, tensor product theory for vertex operator algebra modules, starting with the definition of the tensor product functors and the construction of tensor product modules themselves, is, and must be, quite elaborate. Roughly speaking, the analogue in vertex operator algebra theory of semisimple Lie algebras is the important class of finitely reductive vertex operator algebras, with every module completely reducible. But one certainly also needs a natural analogue of module theory for general, non-semisimple Lie algebras, and the result is "logarithmic tensor product theory" for suitably general vertex operator algebra modules, developed in joint work with Yi-Zhi Huang and Lin Zhang. I will sketch this viewpoint and discuss related results and applications.