Abstract

In a series of celebrated work, Kazhdan and Lusztig constructed braided tensor category structure on representation categories of affine Lie algebras when the level plus dual Coxeter number is not a positive rational number, and proved that the category is equivalent to the category of quantum groups at the corresponding parameter. In this talk, we discuss our recent progress on tensor categories at positive rational levels using vertex operator algebra approach. Concretely, we construct braided tensor category structure on the category of ordinary modules for simple affine vertex operator algebras and prove rigidity in some cases. For affine sl_2 Lie algebra, we also study two bigger representation categories, one is the category of weight modules for the simple affine vertex operator algebra, which is neither finite or semisimple, we prove its rigidity, the other is the category of finite length generalized modules for the universal affine vertex operator algebra, we show this category is derived equivalent to the category of the quantum groups at the corresponding parameter.