

On the representation theory of the vertex algebra $L_{-5/2}(sl(4))$

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In this talk we study the representation theory of non-admissible simple affine vertex algebra $L_{-5/2}(sl(4))$. This case is of particular interest since it appears in conformal embeddings of affine vertex algebras. We determine an explicit formula for the singular vector of conformal weight four in the universal affine vertex algebra $V^{-5/2}(sl(4))$ and show that it generates the maximal ideal in $V^{-5/2}(sl(4))$. We classify irreducible $L_{-5/2}(sl(4))$ -modules in the category \mathcal{O} and determine the fusion rules between irreducible modules in the category of ordinary modules $KL_{-5/2}$. We also prove that $KL_{-5/2}$ is a semi-simple, rigid braided tensor category.

In our proofs we use the notion of collapsing level for the affine \mathcal{W} -algebra, and the properties of conformal embedding $gl(4) \hookrightarrow sl(5)$ at level $k = -5/2$. We show that $k = -5/2$ is a collapsing level with respect to the subregular nilpotent element f_{subreg} and we prove certain results on vanishing and non-vanishing of cohomology for the quantum Hamiltonian reduction functor $H_{f_{subreg}}$. This is joint work with D. Adamović and O. Perše.