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Simple representations of simple Lie algebras remain Indecomposable restricted to some Abelian Subalgebras

In this talk we show that any finite dimensional irreducible representation of a complex simple Lie algebra of rank n remains indecomposable if restricted to some abelian subalgebras of the (minimal as it will be explained in the talk) dimension n, extending the corresponding result obtained in [1] (Theorem 3.9) for the simple Lie algebra of type A_n. Such abelian subalgebra $\mathfrak{a}$ can be constructed as follows.

Let $\mathfrak{g}$ be the complex simple Lie algebra, $\mathfrak{h} \subset \mathfrak{g}$ its Cartan subalgebra and $\Delta = \Delta(\mathfrak{g}, \mathfrak{h})$ the corresponding set of roots. Further for any $\alpha \in \Delta$ let X_α be a basis of root space $\mathfrak{g}_\alpha = \{X \in \mathfrak{g} | \ [H, X] = \alpha(H)X \ \forall H \in \mathfrak{h}\}$, $\Pi = \{\alpha_1, \ldots, \alpha_n\}$ a set of simple roots in Δ and set $Y_{\alpha_i} = X_{-\alpha_i}$, then $\mathfrak{a}$ is the abelian subalgebra of $\mathfrak{g}$ spanned by the vectors $\{Y_{\alpha_{2i+1}}\}$ $(i = 0, \ldots, \left[\frac{n}{2}\right])$ and $\{X_{\alpha_{2j}}\}$ $(j = 1, \ldots, \left[\frac{n}{2}\right])$, where $[x]$ denotes the integer part of x.

[1] P. Casati *Irreducible SL_{n+1}–Representations remain Indecomposable restricted to some Abelian Subalgebras* Journal of Lie Theory Volume **20** (2010) 393–407