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The Image of the Lepowsky Homomorphism for $SO(n, 1)$ and $SU(n, 1)$

Let G_o be a classical rank one semisimple Lie group and let K_o denote a maximal compact subgroup of G_o . Let $U(\mathfrak{g})$ be the complex universal enveloping algebra of G_o and let $U(\mathfrak{g})^K$ denote the centralizer of K_o in $U(\mathfrak{g})$. Also let $P : U(\mathfrak{g}) \rightarrow U(\mathfrak{k}) \otimes U(\mathfrak{a})$ be the projection map corresponding to the direct sum $U(\mathfrak{g}) = (U(\mathfrak{k}) \otimes U(\mathfrak{a})) \oplus U(\mathfrak{g})\mathfrak{n}$ associated to an Iwasawa decomposition of G_o adapted to K_o . In this paper we give a characterization of the image of $U(\mathfrak{g})^K$ under the injective antihomomorphism $P : U(\mathfrak{g})^K \rightarrow U(\mathfrak{k})^M \otimes U(\mathfrak{a})$ when G_o is locally isomorphic to $SO(n, 1)$ and $SU(n, 1)$.

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