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Diamond cones and quasistandard Young tableaux

Abstract. In this lecture, we shall recall the notion of shape algebra S for a semisimple Lie algebra \mathfrak{g} . Then we define the diamond cone C of \mathfrak{g} as a quotient of S .

Diamond cone was introduced by N.J. Wildberger for $\mathfrak{sl}(3)$. If \mathfrak{n} is the nilpotent part of the Iwasawa decomposition of \mathfrak{g} , the diamond cone is a \mathfrak{n} module, built from the collection of all maximal, locally nilpotent \mathfrak{n} modules.

To understand the structure of the \mathfrak{n} module C , we look for an explicit, combinatorial basis for C . Generally speaking, such a basis is given by particular Young tableaux: the quasistandard Young tableaux. We shall present here explicit results for the following cases:

$\mathfrak{g} = \mathfrak{sl}(m)$ (with N. Bel Baraka and N.J. Wildberger),

$\mathfrak{g} = \mathfrak{sp}(2m)$ (with O. Khlifi),

$\text{rank}(\mathfrak{g}) = 2$ (with B. Agrebaoui and O. Khlifi),

$\mathfrak{g} = \mathfrak{sl}(m, 1)$ (this generalization is due to O. Khlifi).