

Partition Identities from Representation Theory of Affine Kac-Moody Algebras

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Abstract

The study of characters and related structural problems of representations of an affine Kac-Moody algebra $\widehat{\mathfrak{g}}$ often leads to proofs of interesting identities of combinatorial nature. In this talk we discuss the relation between two such structural problems: the one of computing multiplicities of irreducible modules in tensor products of two integrable irreducible modules of $\widehat{\mathfrak{g}}$ and that of computing multiplicities in Demazure flags of a given Demazure module. Our main result expresses the former in terms of the latter in the case that the underlying simple Lie algebra is simply laced. By combining our result in the case of $\widehat{\mathfrak{sl}}_2$ with the existing answers to the first problem, we obtain interesting partition identities.