

# Accepted Manuscript

Determinant formula for parabolic Verma modules of Lie superalgebras

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PII: S0021-8693(17)30575-6

DOI: <https://doi.org/10.1016/j.jalgebra.2017.11.011>

Reference: YJABR 16436

To appear in: *Journal of Algebra*

Received date: 10 April 2016

Please cite this article in press as: Y. Oshima, M. Yamazaki, Determinant formula for parabolic Verma modules of Lie superalgebras, *J. Algebra* (2018), <https://doi.org/10.1016/j.jalgebra.2017.11.011>

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# DETERMINANT FORMULA FOR PARABOLIC VERMA MODULES OF LIE SUPERALGEBRAS

YOSHIKI OSHIMA AND MASAHITO YAMAZAKI

ABSTRACT. We prove a determinant formula for a parabolic Verma module of a contragredient finite-dimensional Lie superalgebra, previously conjectured by the second author. Our determinant formula generalizes the previous results of Jantzen for a parabolic Verma module of a (non-super) Lie algebra, and of Kac concerning a (non-parabolic) Verma module for a Lie superalgebra. The resulting formula is expected to have a variety of applications in the study of higher-dimensional supersymmetric conformal field theories. We also discuss irreducibility criteria for the Verma module.

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## 1. INTRODUCTION

The study of Verma modules [1] is a rich subject in the representation theory of Lie algebras and their universal enveloping algebras (see e.g. [2, 3, 4] and references therein). Given a Verma module, one natural question is to ask precisely when the Verma module is irreducible/reducible, and if reducible to determine the composition factors of the module.

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