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Investigation of higher spin theory through holography and mathematical methods in free conformal field theory

Rabe, Randle

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Abstract for MSc Dissertation by Randle Rabe 1296569

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Abstract

In this dissertation, we will develop novel methods for determining the spectrum of primary operators in a free conformal field theory (vector model) and to construct some of these primaries. To count the spectrum of primaries, we use group theoretic techniques to obtain character formulas for any number of fields as representations of $SO(4,2)$. More precisely, we will construct generating functions that can be expanded to any order in the conformal scaling dimension Δ to yield the complete spectrum of primaries constructed out of n scalar fields. We also develop efficient methods to construct these primaries by using a polynomial description. Finally, these primary operators, which are higher spin currents in the free conformal vector model, correspond to higher spin gauge fields in Vasiliev higher spin theory through the holographic duality.