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1 Introduction

We thank the referees for the detailed reading of the manuscript and the numerous helpful comments. We did not disagree with any of the comments and have made a number of changes to the manuscript in response to the feedback.

2 Major changes

- **An introduction to the paper**: We present a roadmap for the exposition as well as highlight the key ideas of the paper, which is to compare and contrast group objects in the smooth and algebraic settings.

- **Details about reducibility of representations have been added to the paper**: brief remarks about Weyl's unitary trick and references to the literature have been added.

- **The issue of freely moving between the smooth and algebraic category** [UG general 5]: This is the largest change to the paper and we thank the referees for pointing out the need for more details. We have adjusted the paper as follows. When we discuss the aspects of the proof of the Theorems of the Highest Weight, we make it clear that we are working in the smooth setting. In particular we make use of the exponential map. Immediately after, we turn our attention to the algebraic setting and in particular, redescribe the Lie algebra of G in terms of the Zariski tangent space. We then proceed to discuss the theorem in such context.

- **The incorrect statement** "Studying the action of $\mathfrak{gl}(2, \mathbb{C})$ is equivalent to studying the action of $\mathrm{GL}(2, \mathbb{C})$ on V because $\mathrm{GL}(2, \mathbb{C})$ is connected" has been corrected to reflect the simply-connectedness of $\mathrm{GL}(2, \mathbb{C})$.

- **References have been bibtexed** and chapter references have been added to the paper.

3 Minor changes

- Spelling and style corrections have been made throughout the manuscript, wherever the referees have pointed out errors [UG Specific comments].

- More details about conventions and notations have been added to the paper [UG specific comments].

- The examples about the standard and symmetric power representations have been upgraded to highlight the highest weights [UG general 4].

- Motivation for Hopf algebras has been added

- Uniqueness of comultiplication map addressed [G major 1]

- Definition of positive system in the case of $\mathfrak{gl}(2)$ has been made more clear.