

Referee reports of SciPost: Generalized Symmetries and Anomalies of 3d N=4 SCFTs

1 Referee report

The manuscript presents a thorough study of generalized global symmetries and their 't Hooft anomalies in 3d $\mathcal{N} = 4$ superconformal field theories (SCFTs). An essential feature of this study is the method used to deduce generalized symmetries and their anomalies for the Coulomb branch from the UV Lagrangian. The primary focus of the study is on good quiver gauge theories with (special) unitary gauge groups. As a concrete example, the T[SU(n)] theories are first studied from this viewpoint in great details. Then, more general quiver theories are considered. The authors make their results even more concrete by presenting various consistency checks, using magnetic quiver techniques.

The paper is a well-structured, detailed, and strong contribution to the study of generalized symmetries and 't Hooft anomalies in 3d $\mathcal{N} = 4$ SCFTs. The technical depth, combined with solid consistency checks, makes it an important work in the area. After the following points are addressed, I believe the paper would be a good fit for publication in SciPost.

- The paper [1] is one of the pioneering papers which provide a detailed examination of 2-groups and their 't Hooft anomalies. It is important to cite this work.
- The hat notation appears first in Eqn.(2.10), which is supposed to indicate the Pontryagin dual. This notation should be mentioned.
- In the first line of the first bullet in p.11, $\lambda_j = 0$ is supposed to be $m_j = 0$.
- Below Eqn.(4.11), oft-called \rightarrow so-called
- Above Eqn.(4.13): "The charge q_i of O under $U(1)_i$ for $i \in \mathcal{U}$ is n_i " \rightarrow "The charge of O under $U(1)_i$ for $i \in \mathcal{U}$ is q_i ". Anyhow, the use of n_i should be avoided since it is used as a rank of a unitary group right below.
- Eqn.(4.13) gives the definition of Dynkin coefficients for topological symmetry \mathfrak{f}_a . It is unclear why it involves the summation over unbalanced unitary nodes in \mathcal{U} . The reason needs to be elaborated. If it is a typo, it should be corrected.

References

- [1] F. Benini, C. Córdova and P.-S. Hsin, *On 2-Group Global Symmetries and their Anomalies*, *JHEP* **03** (2019) 118 [1803.09336].