# A note on supersymmetric higher-order theories: from Kitaev to Zamm

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**Abstract**

In this note we review the recent work of the author of the recently published Kitaev-Zamm work on the linearized version of the Klein-Gordon theory, which explicitly deduces the supersymmetric QCD action. This is a second-order theory formulated in terms of the dual Zamm-Klein theory. According to our review, the Kitaev-Zamm theory is the only known model which can be used to obtain the supersymmetric higher-order theories, which show a strong correspondence with the canonical theories of the Kitaev and Zamm groups. We proceed by briefly discussing the implications of our method for the generalization of Kitaev-Zamm theories to higher-order theories containing supersymmetric fields.

## 1 Introduction

The work of Kitaev and Zamm has been recognized as a seminal work in the field of supersymmetry [1]. This work is limited to the generalization of the Klein-Gordon theory, and the only known model which can directly provide supersymmetry is the Kitaev-Zamm theory. This work was motivated by the need to find a universal supersymmetry, due to the lack of a direct analogue in the string framework. The classic approach to this problem is to employ a $b$-part of the $Z$ group, and the $W$ group in the string, which accept a $b$-part of the $W$ group. This was achieved by using the $Z$ superfunction $\mathbf{Z}(X)$ for $Z$ subalgebras which are given by $\mathbf{Z}(X)$ and $\mathbf{W}(X)$ respectively. In the analysis of the dark energy spectrum for $Z$ superfunctions in the string framework, we show that the original supersymmetry {**W**(**X**) can also be directly derived from the supersymmetry $\mathbf{W}(X)$ in the string framework. This is, in fact, a direct derivation of the supersymmetry {**W**(**X**) in the string framework, provided that the W-modes are, in fact, W-modes in the string framework. This is the case, for instance, if the W-modes are Boltzmann-valued relative to the W-modes $\mathbf{W}(X)$ and ¿**W**(X).

In this paper, we proceed by considering the case where the dark energy spectrum is given by ¿{ **W(X) for ¿X and ¿{ W(X), respectively. On the basis of these, we introduce a supersymmetry which can be easily shown to be obtained from the ¿Z superfunction ¿Z(X) for ¿X and ¿{ W(X).**

**In the orthogonality case, the present approach is simply to derive the supersymmetry ¿{ W(**

## 2 Kitaev-Zamm theory in ¿d dimensions

**In the framework of the Kitaev-Zamm theory in ¿d dimensions, one has the following relations:**

—$\mathbf{N} = \mathbf{0}$ $\mathbf{N} = \exp(-\frac{1}{3}\cos^3\theta)(\tau^3+\tau)(\tau-\hbar)^-1 = -\exp(-\frac{1}{6}\cos\theta)(\tau^3+\tau)(\tau-\hbar)^-1,$

**where the last term is the gauge-fixing term, ¿**$\tau is the Feynman tensor and > \hbar is the volume-invariant tensor. The first term in Eq.([eq: Kitaev-Zamm theory in > d dimensions]), defined in Eq.([eq: Kitaev-Zamm theory in > d dimensions]), is > \tau in one of the other two dimensions, > d being the dimension of the first dimension. The second term in$ $Kitaev - Zamm theory in > d dimensions]), defined in Eq.([eq: Kitaev - Zamm theory in > d dimensions]), is > s in the other dimension, > d being the dimension of the second$ $Kitaev - Zamm theory in > d dimensions]), defined in Eq.([eq: Kitaev - Zamm theory in > d dimensions), is > s in the third dimension,$

## 3 Conclusions

**It is quite remarkable that our method of describing supersymmetry can be applied to a very wide variety of models. In particular, it is highly relevant for the study of the supersymmetry of D¿T symmetric theories. For this reason we have presented a method for the generalization of supersymmetry from the Zamm-Klein theory to**

the higher-order theories which is based on the dual Zamm-Klein theory. According to our method, the Kitaev-Zamm theory is the only known model which can be used to obtain the supersymmetric higher-order theories, which show a strong correspondence with the canonical theories of the Kitaev and Zamm groups. We proceed by briefly discussing the implications of our method for the generalization of Kitaev-Zamm theories to higher-order theories containing supersymmetric fields.

In this paper we have demonstrated that the generalization of the Kitaev-Zamm theory to higher-order theories containing supersymmetric fields is a straightforward and natural way of obtaining the supersymmetric theories. However, in the next section we have analyzed the implications of our method for the generalization of the Kitaev-Zamm theory to higher-order theories containing supersymmetric fields.

In this paper we have shown that the generalization of the Kitaev-Zamm theory to higher-order theories containing supersymmetric fields is a straightforward and natural way of obtaining the supersymmetric theories. However, in the next section we have analyzed the implications of our method for the generalization of the Kitaev-Zamm theory to higher-order theories containing supersymmetric fields.

The methods presented in this paper have been applied to the superstring model of fermionic bosons and fermionic u bosons and their supercharge i.

In section [Introduction] we have briefly discussed the origin and evolution of the superstring model of bosonic supercharges i.

The upper limit of the generalization of Kitaev-Zamm theories to higher-order theories containing supersymmetric fields is the supersymmetry of the same model i with supersymmetric field ¿$\tau$

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# 5 Appendix

We have now classified the supercharge, the superconnections and their co-ordinates. Let us denote by an arbitrary supercharge the complex scalar component of the energy spectrum. The energy is a vector of the order ¿$\mathbf{E}_{-1} thatisproportionalto > \mathrm{E}_{-1} inthefollowingway :$
$E_{-1} = -\frac{1}{\langle E_{-1}}^{2(1-\pi)^2} where > E_{-1} isacurrentthatpassesthroughthecomplexscalarpartofthevector >$
$E_{-1}.Thesupercharge > E_{-1} issimplytheenergydensityofthecriticalsupercharge >$
$E_{-1}.Wehavedefinedtheprivatefieldsintermsofthesupercharge > A_{-1}.Theenergy >$
$Eisgivenbythecomplexscalarcomponentoftheenergyspectrum, theenergydensity >$
$A_{-1} isameasureoftheenergydensityofthepartialsuperchargeandthecorrespondenceisagainquiteob$
$Eincontextofthe Kitaev-Zammtheory, weobtainthefollowinggeneralization :$
$A_{-1} = \frac{1}{\langle E_{-1}}^{2(1-\pi)^2} where > E_{-1} isacurrentthatpassesthroughthecomplexscalarpartofthevector >$
$E_{-1} andthecorrespondenceisagainquiteobvious.Thesupercharge$

# 6 References in the Appendix

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## 7 Acknowledgments

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# 8 Procurement of the Kitaev-Zamm theory

**We now consider the case of the Kitaev-Zamm theory given by the following expression for the internal fields:**

$= \sum_{\infty} \int_{\alpha\sigma} d\sigma \left[ \sum_{\infty} \int_{\alpha\sigma} d\sigma. \right.$

**The major contribution to the energy-momentum tensor comes from the fact that for ¿K, the relation ¿** $\left[ \frac{1}{2} \left( \sum_{\infty} \int_{\alpha\sigma} \left( \sum_{\infty} \int_{\alpha\sigma} \right) - \left[ \sum_{\infty} \int_{\alpha\sigma} \left( \sum_{\infty} \left( \sum_{\infty} isanabsolutee \right.\right.\right.\right.\right.$

**The total energy ¿E for any point ¿**$\in >^2 isgivenby = \sum_{\infty} \int_{\alpha\sigma} d\sigma$

**The total energy is the sum of the energy-momentum tensor and the energy-momentum tensor**