A Lecture on Topological Defect

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1 What is this

This is a lecture note prepared for two sets of "intensive lectures":[1]

- at Tohoku University, Oct. 11-13, 2023, and
- at Yukawa Insititute, Nov. 29-1, 2023.

In this lecture I will try to explain the constructions of topological defects corresponding to generalized symmetries. Due to lack of time and (more significantly) my understanding, the lecture will focus on bosonic systems, and the generalization to fermionic systems is left for the readers/audiences.

1.1 Other Lectures/Reviews

Recently there has been a surge of lecture notes/ review articles on generalized symmetries. The ones I have noticed are

- [1]
- [2]
- [3]
- [4]
- [5]

There are probably more. Because this lecture will focus on the fundamental aspects of the topic and will not connect very well with the existent literature (so sorry about that), readers/audiences are strongly encouraged to refer to at least one of them, or something similar.

Also, about conventional symmetries and their anomalies, there are nice old lectures. The one I would particularly recommend is [6].

[1] In Japan, an "intensive lecture" is a format of a lecture course where a lecturer (usually from another university) gives lectures in consecutive days filling 7-9 slots in usually 3 days.

2 Introduction

2.1 Symmetry

Symmetry plays a fundamental role in theoretical physics. In this lecture we consider them in *quantum* theory. The importance of symmetry in the quantum world is established by

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test

3 Summary

In summary, this book has no content whatsoever.

References

[1] S. Schafer-Nameki, "ICTP Lectures on (Non-)Invertible Generalized Symmetries", (2023), arXiv:2305.18296 [hep-th].

[2] P. R. S. Gomes, "An introduction to higher-form symmetries", SciPost Phys. Lect. Notes **74**, 1 (2023), arXiv:2303.01817 [hep-th].

[3] L. Bhardwaj, L. E. Bottini, L. Fraser-Taliente, L. Gladden, D. S. W. Gould, A. Platschorre, and H. Tillim, "Lectures on Generalized Symmetries", (2023), arXiv:2307.07547 [hep-th].

[4] R. Luo, Q.-R. Wang, and Y.-N. Wang, "Lecture Notes on Generalized Symmetries and Applications", in (July 2023), arXiv:2307.09215 [hep-th].

[5] S.-H. Shao, "What's Done Cannot Be Undone: TASI Lectures on Non-Invertible Symmetry", (2023), arXiv:2308.00747 [hep-th].

[6] T. Yuji, "Lecture on anomalies and topological phases", (2019), https://member.ipmu.jp/yuji.tachikawa/lectures/2019-top-anom/.