

THESIS TITLE
SECOND LINE IF NECESSARY

by

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Abstract

This is my abstract.

Acknowledgments

Blah blah blah.

Statement of Originality

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Chapter 1

Introduction

The cosmic sky has entranced humans for as far as recorded history can trace. As technology evolved, so too did the observation of the universe around us; from the naked eye to primitive telescopes, and eventually to present day space telescopes, like the Hubble Space Telescope and the upcoming James Web Space Telescope (**NEED TO CITE THESE**). These growing technological leaps have also resulted in the exploration of the incredibly small and eventually resulted in the discovery of the neutrino [7]. It was perhaps inevitable that these two seemingly separate areas of physics would eventually meet.

1.1 Neutrinos

The neutrino is a fundamental particle first proposed by Wolfgang Pauli [2], and then later discovered in 1956 using the byproducts of β^- decay [7]. As research continued into the elusive neutrino, another flavour of neutrino was discovered in 1962 called the muon neutrino (ν_μ) [3] and eventually the final flavour of the tau neutrino (ν_τ) [5].

1.2. NEUTRINO TELESCOPES

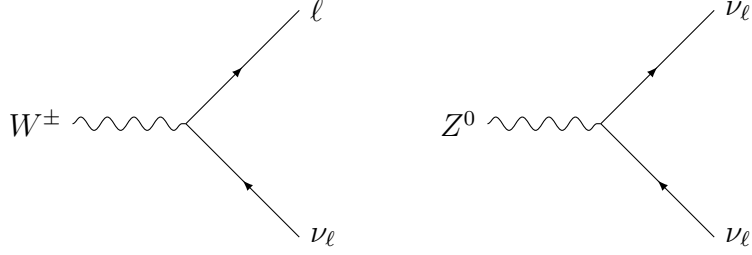


Figure 1.1: The Feynmann diagrams for the vertices that would be included in neutrino interactions using the charged W^\pm boson on the left and the neutral Z^0 boson on the right.

1.1.1 Interactions

Neutrinos are neutral and interact only through the Weak interaction. The Weak interaction is a force that is mediated by the W^\pm and Z^0 massive bosons, and is the force responsible for decays. The main vertices involved in neutrino interactions are shown in Figure [?], where the interacting lepton corresponds with the interacting neutrino flavour.

1.1.2 Production & Sources

1.1.3 Oscillations

Alongside the discovery of the neutrino and their flavours, another problem arose in the field of neutrino physics: the solar neutrino problem [6]. During the 1960's, an experiment was proposed by Bahcall and Davis to measure the solar neutrino flux, referred to the Homestake experiment [4, 1].

1.2 Neutrino Telescopes

Chapter 2

The Pacific Ocean Neutrino Explorer

2.1 Detectors

2.1.1 Geometry

2.2 Ocean Networks Canada

Chapter 3

Simulation

- 3.1 IceCube Framework
- 3.2 Simulating Neutrinos
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Reconstruction

4.1 Linefit

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Results

5.1 Likelihood

Chapter 6

Summary and Conclusions

6.1 Summary

6.2 Future Work

6.3 Conclusion

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