

Thesis

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Preface

Abstract

Zusammenfassung

1 Introduction

See Knuth (1984)

2 High-Energy Cosmic Particles

2.1 Cosmic rays

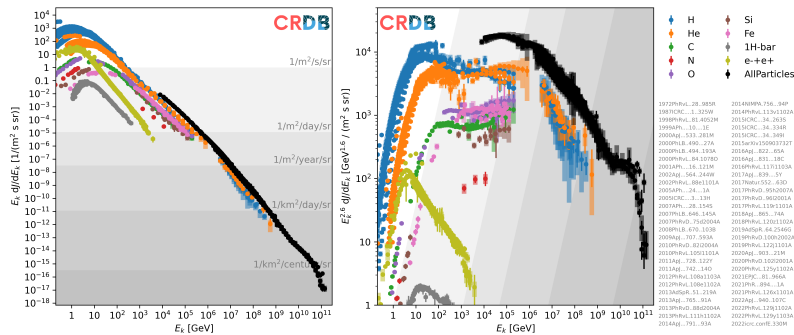


Figure 2.1: CRs

2.2 Gamma rays

2.3 Neutrinos

2.4 Multi messenger astronomy

3 Neutrino Observatories

3.1 The IceCube Neutrino Observatory

3.2 The Pacific Ocean Neutrino Experiment (P-ONE)

4 Software Packages

4.1 skyllh

4.1.1 Unbinned likelihood ratio

4.1.2 Stacking

4.1.3 Custom flux models, including Seyfert flux model

4.2 p1skyllh

4.3 skykde tool

4.4 icetray

4.4.1 ml_suite

4.4.2 photospline

5 Improved Point Source Analysis

5.1 Point source likelihood ratio test

5.2 Reconstruction of observables

5.2.1 BDT

5.2.2 KDE

5.3 Point source methods: skyscan, catalog search, binomial test

5.4 Analysis performance: biases, sens, dp

5.5 Results

6 Seyferts

6.1 Seyferts–neutrino connection

6.2 Core-corona model

6.3 BASS catalog

6.3.1 swift

6.3.2 nustar?

6.4 Point source methods: stacking

6.5 Analysis performance: biases, sens, dp

6.6 Results

7 Extended Point Source Analysis

7.1 Monte-Carlo and KDE improvements

7.2 IC79 subselection

7.3 Analysis performance: biases, sens, dp

7.4 Results

7.5 Future work

7.5.1 normalizing flows

7.5.2 likelihood free inference

8 Conclusion

9 Acknowledgements

References

Knuth, Donald E. 1984. “Literate Programming.” *Comput. J.* 27 (2): 97–111. <https://doi.org/10.1093/comjnl/27.2.97>.