Cosmological Evidences of Dark Matter through the CMB

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1 Introduction

Many astronomical and cosmological observations suggest that there is an invisible form of matter that interacts gravitationally. Therefore, scientists have proposed the existence of a new form of matter that does not interact electromagnetically but gravitationally: Dark Matter. Neverthless the fundamental nature of Dark Matter is not well understood, there are strong evidences for the existence of Dark Matter. One of the most important evidence of the existance of Dark Matter comes from the analysis of the Cosmic Microwave Background.

Since Dark Matter does not interact electromagnetically, its existence has been animatedly discussed.

-[1] brief thermal history of the universe and how to get to the cmb and what is it?
-practical Motivation for studyinbg the cmb: nice spectrum black body spectrum: physics well know, very intense radiation
which info can we get from the cmb: Big bang, maater and energy content of the universe—dark matter is a big part of the matter content it influenced the spectrum of the CMB —- so it played a role.
-structure of the paper

2 From the Discovery of the CMB to the Planck mission

[2] -discovery of the cmb
-filterng of the images
-different missions

3 Content of the Universe

- Assumptions: working with the ΛCDM model

- General relativty
- Friedmann equations

4 CMB theo analysis

- hydrodynamics [3] page 14 eq 49 to page 17 eq 71
  skip doppler effect
- gravito acoustic oscillations page 19 up to eq 82 , justify briefly constant potential in page 20
- page 20 and 21 up to eq92 important comment
- baryonic effect

5 Comments on the results and plots of the CMB spectrum

Figure 1: The Universe

6 Conclusion

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References

[1] Wayne Hu. http://background.uchicago.edu/˜whu/index.html.

[2] Martin Bucher. Physics of the cosmic microwave background anisotropy. January 2015.

[3] Wayne Hu. Lecture Notes on CMB Theory: From Nucleosynthesis to Recombination. *arXiv:0802.3688 [astro-ph]*, February 2008.

[4] Nikhil Padmanabhan and Douglas P. Finkbeiner. Detecting Dark Matter Annihilation with CMB Polarization : Signatures and Experimental Prospects. *Physical Review D*, 72(2), July 2005.