

15.6: Wrapping It Up 15 - Using CMB Data to Determine Cosmological Parameters

Learning Objectives

- You will be able to use CMB anisotropy power spectra to compare to data with models and determine parameters (baryon fraction, cold dark matter, curvature) to demonstrate their understanding of how models compare with data. Parameters will be adjusted individually rather than jointly in this activity. You will further explore the telescopes used to study the CMB.

“We know of an ancient radiation

That haunts dismembered constellations

A faintly glimmering radio station...”

– Cake

15.6.1: I. Cosmological Parameters

In the first part of this activity you will combine what you have learned about the CMB power spectrum in order to determine the values of several cosmological parameters: the amount of regular matter (the baryon fraction), the amount of cold (exotic) dark matter (CDM), and the curvature of space overall.

You will do this by comparing theoretical models to data from the most recent satellite, Planck. Though scientists actually vary all of the parameters at once in their analysis, you will compare each parameter individually in this activity for now.

For simplicity, we have not shown all of the models. We have provided models for only a few values of the parameters, but scientists can compute additional models for greater precision and better fits.

15.6.1.1: A. Curvature

[Play Activity](#)

1.

2.

15.6.1.2: B. Amount of Baryonic Matter

[Play Activity](#)

1.

2.

3.

15.6.1.3: C. Amount of Cold Dark Matter

[Play Activity](#)

1.

2.

3.

15.6.2: II. CMB Observations: A Scavenger Hunt

In this chapter you have learned about several key things astronomers measure using the CMB. NASA keeps a list of CMB experiments, with basic information about each, as well as links to websites of each of the CMB groups. Browse the [list](#) and answer the following questions.

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

This page titled [15.6: Wrapping It Up 15 - Using CMB Data to Determine Cosmological Parameters](#) is shared under a [CC BY-NC-SA 4.0](#) license and was authored, remixed, and/or curated by [Kim Coble, Kevin McLin, & Lynn Cominsky](#).