Space: Its Light, Its Shape.

Cosmology Part VI: Many Cosmological Models

Assignment: For Monday, Wednesday, April 20

- Read the parts of chapter 18 in Harrison's *Cosmology* mentioned below. It is available on eReserves.
- Please feel free to bring up other issues you find interesting or puzzling. If at all possible send an email before seminar to me. I will present this topic as my assignment or open it up to discussion by the whole seminar.
- Some of these require additional reading for the presenting team. If I don't explicitly give the reference then the additional information is easy to find on the internet.
- Though everyone is responsible for reading all of the material and for working out all of the exercises, teams have been specific material and exercises for which they are responsible in class presentations. You may want to come to class early to firm up and smooth out the exercises with your teammates.

Team 1: In a spherical static universe tell us what we would see if a spaceship moved away from us. What is the circleland version of this? Does Jeff Weeks have this demo on his web site?

Team 2: Recall for us what H and q are.

Team 3: Show that the equations 16.23 and 16.24 reduce to 18.1 and 18.2 under the above conditions.

Team 4: Define the circumnavigation time for spherical space.

Team 1: Use Eddington's observation on the Einstein static model to show why this is an "unphysical" or unrealistic model.

We'll skip the "Last static steady-state universe" section.

Team 2: Sketch an describe the de Sitter universe.

Team 3: Use the notes at the end of the chapter to explain the re-written Friedmann equations of 18.8 and 18.9

Team 4: Why is $q = 1/2$ an important value?

Team 1: Sketch and explain the three classes of Friedmann models that Harrison mentions.

Team 2: What is the critical density and how does it fit in the Friedmann equations?

Team 3: Walk us through the life cycle of a closed Friedmann model.

Team 4: Describe the open Friedmann models.

Team 1: What is the difference between Friedmann models and Friedmann-Lemaitre models?

Team 2: How can we see the instability of the Einstein model in figure 18.10?

Team 3: Why does the effect of Λ "win" at late times in the Lemaitre model (figure 18.10)?

Team 4: Describe the three different methods to classify cosmological models that Harrison uses.

Although I encourage you to read the rest of the chapter if you wish, we'll leave the text on page 368.

Team 1: If you wished to determine which model we actually live in, how would you go about it? Hint: Which parameters do you need?

Team 2: See if you can find current values of the cosmological parameters that we have be discussing. Use the internet to search for "deceleration parameter" and the like.