

3.5 Light and the Electromagnetic Field

PRE-LECTURE READING 3.5

- *Astronomy Today*, 8th Edition (Chaisson & McMillan)
- *Astronomy Today*, 7th Edition (Chaisson & McMillan)
- *Astronomy Today*, 6th Edition (Chaisson & McMillan)

VIDEO LECTURE

- Light and the Electromagnetic Field¹ (11:07)

SUPPLEMENTARY NOTES

Vacuum

- See Vacuum².
- Light travels as a wave.
- All waves require a medium.
- Vacuum is defined as the absence of any medium.
- Hence, vacuum cannot be the medium through which light travels.

Electromagnetic Field

- See Electromagnetic Field³.
- Electromagnetic fields are analogous to gravitational fields: They emanate from charges as gravitational fields emanate from masses.
- If a charge is stationary, there are no waves in its electromagnetic field.
- If a charge moves back and forth, this motion creates a wave in its electromagnetic field.
- If other charges encounter this wave, they move back and forth in response.
- This is how radio waves are emitted and received.
- Radio waves are light. Indeed, this is how all light is emitted and received.
- Hence, light is a wave in the electromagnetic field.
- And the electromagnetic field is the medium through which light waves travel.

¹<http://youtu.be/UII2b5BTYGY>

²<http://en.wikipedia.org/wiki/Vacuum>

³http://en.wikipedia.org/wiki/Electromagnetic_field

In both this course and Astronomy 102, we will learn about different physical processes that move charge back and forth. Each results in a different spectrum of light.

ASSIGNMENT 3

- Do Question 3.