Lecture 4: Light and Matter

Slide 2: Blackbody Continuous Spectrum
A reminder of how a continuous blackbody spectrum depends on temperature

Slide 3: Three Main Types of Spectra
What are the main three types of spectra?
Can you describe in words the main characteristics of the three types of spectra?

Slide 4: Spectra of Stars and Hot Gas
What kind of spectrum does a star have?
What kind of spectrum does a nebula (hot low density gas) have?

Slide 5: Discrete Absorption and Emission
What process occurs in an atom when a photon is absorbed by the atom?
What processes occurs in an atom when a photon is emitted by the atom?
What is the relationship between the energy of a photon that is absorbed or emitted by an atom and the *change* in energy of the electron?

Slide 6: Only Specific Photon Energies...
Can a photon with any energy be absorbed by an atom?
If not, what dictates which photons can be absorbed or emitted by a given atom?

Slide 7 & 8: All Combination are Permitted...
What is the Lyman series? The Balmer series? The Paschen Series?
Which electron transition does hydrogen undergo when it emits the red photon at 656.3 nm?
How does one determine the energy and wavelength of a photon that can be absorbed by or emitted from hydrogen?

Slides 9 & 10 Examples of Emission Spectra of Common Elements
Why does each unique element have its own unique emission/absorption spectrum?
Why is this important for astronomy and astrophysics?

Slide 11 & 12: Type of Spectrum Depends Upon How You View Objects
What kind of spectrum do you see when looking directly at a hot dense object?
What kind of spectrum do you see when you view a hot dense object through a low-density gas? What causes the discrete features in the spectrum?
What kind of spectrum do you see when you directly view a hot low-density gas cloud? What causes the discrete features in the spectrum?

Slides 13 & 14 The Power-Law Spectrum
From what kind of physical environments do we measure a power-law spectrum?
What is the physical process that generates a power law spectrum?
What is the name of the photons emitted in this process?