Three Types of Spectra

Evolution of Stars. Activity 3

Classroom Activity

Material List:

- Worksheet

Outline

By using a computer animation you will explore different types of spectra. Later you will apply the acquired knowledge to the spectrum of the Sun.

Procedure:

Step 1. To Do:

Run the *ClassAction* software and open the animation *Light & Spectra/Three Views Spectrum Demonstrator*.

A. Point the telescope to the light source (incandescent light bulb).

Continuous spectrum is visible.

Continuous spectrum is created when the light is emitted by atoms of glowing filament. The emissions from a heated filament come from individual atoms and interactions between atoms of the filament. There are many modes for atomic interactions and in total they produce the continuous spectrum of emission.

B. Point the telescope to the gas cloud.

Emission spectrum is visible.

Emission spectrum is created when an atom or molecule makes a transition from a high energy state to a lower energy state. Each transition has a specific wavelength and each element's emission spectrum is unique. Therefore, emission spectrum can be used to identify the elements.

C. Point the telescope so the light goes through the gas cloud

Absorption spectrum is visible.

Absorption spectrum is determined by the chemical composition of the gas cloud and can be used to identify the elements. Radiation is absorbed at frequencies that match the energy

difference between two energy states of atoms. The absorption manifests itself as a dark absorption line over the continuous spectrum. Absorption spectrum is typically composed of many absorption lines.

Assessment:

Answer the questions:

1. If we consider a star just being a heated body, what kind of spectrum it would emit?

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2. Let's take into account that star is encircled by the envelope of colder gas (stellar atmosphere). What kind of spectrum we can expect then? _____

3. Sometimes there are clouds of hot, glowing gas around the star. What kind of spectra we can expect from them? _____

Step 2. To Do:

Examine closely the picture of the solar spectrum shown by teacher. Write down the wavelengths of different absorption lines to the table. Answer the questions and discuss your results with the teacher.

Table

Designation	**Element**	**Wavelength, nm**
A	Oxygen	
B	Oxygen	
C	Hydrogen	
D	Sodium	
E	Iron	
F	Hydrogen	
G	Calcium and iron	
H	Calcium	
K	Calcium	

Answer the questions:

1. Name the chemical elements that produce these absorption lines!

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2. How do you think, in which part of the Sun are these chemical elements placed?

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