NASA SpaceApps 2015: Space Wearables Challenge

Using Z-Bot Tool: Sunlight, Starlight and the Spectroscope

Stars are very far away and no spaceship can go there. If we travel at the speed of light, it will take us 4.2 years to travel to the star nearest to us - *Proxima Centauri*.

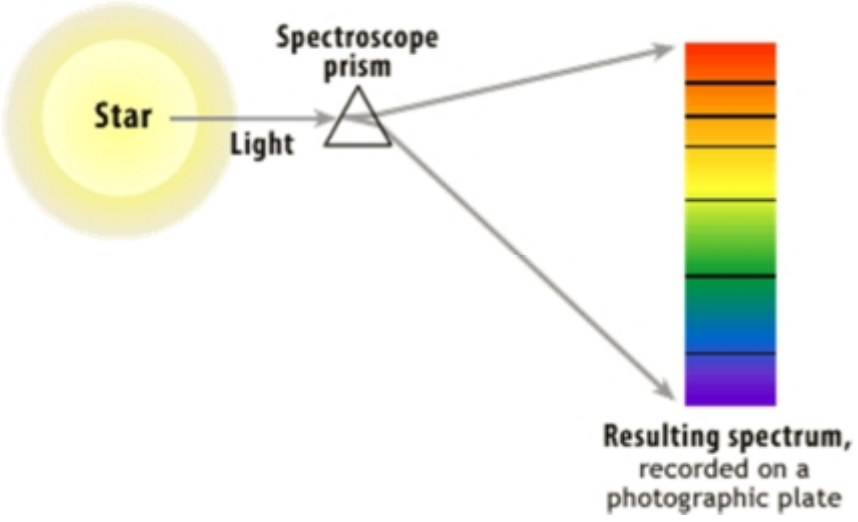
Then how do scientists know so many things about the stars, including their distance from us, their temperature, mass, and chemical composition?

Simply by studying the light reaching to us from the stars! But how?

Have you seen a rainbow in the sky after the rain? It is so colorful! When light from the sun passes through water droplets in the sky, it splits into seven colors - Violet, Indigo, Blue, Green, Yellow, Orange and Red, making a rainbow. This is called the white light spectrum.

Different sources of light give out different kind of spectra, and scientists use this property to study stars. They use an instrument called a spectroscope to make their observations.

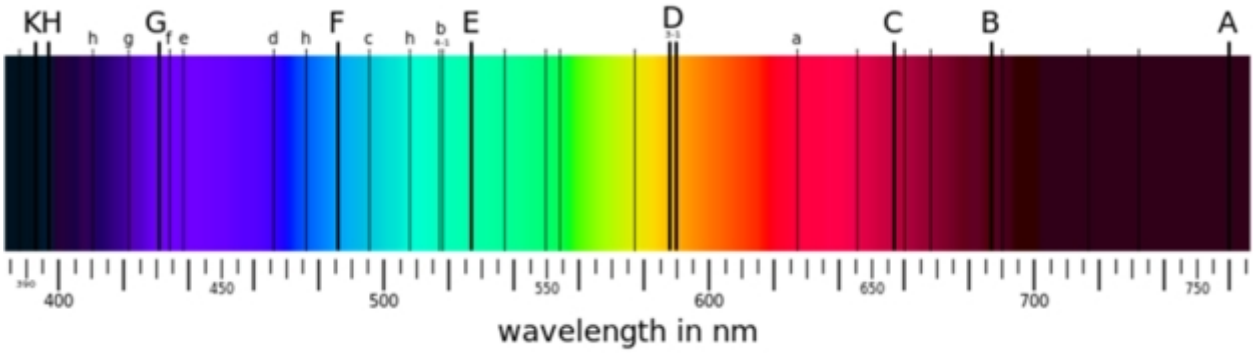
A spectroscope disperses or separates the light from a star into a very wide spectrum of colors — much wider than water droplets can. When spread very wide, black lines appear in the spectrum. ***Why do such lines appear and what do they mean?***



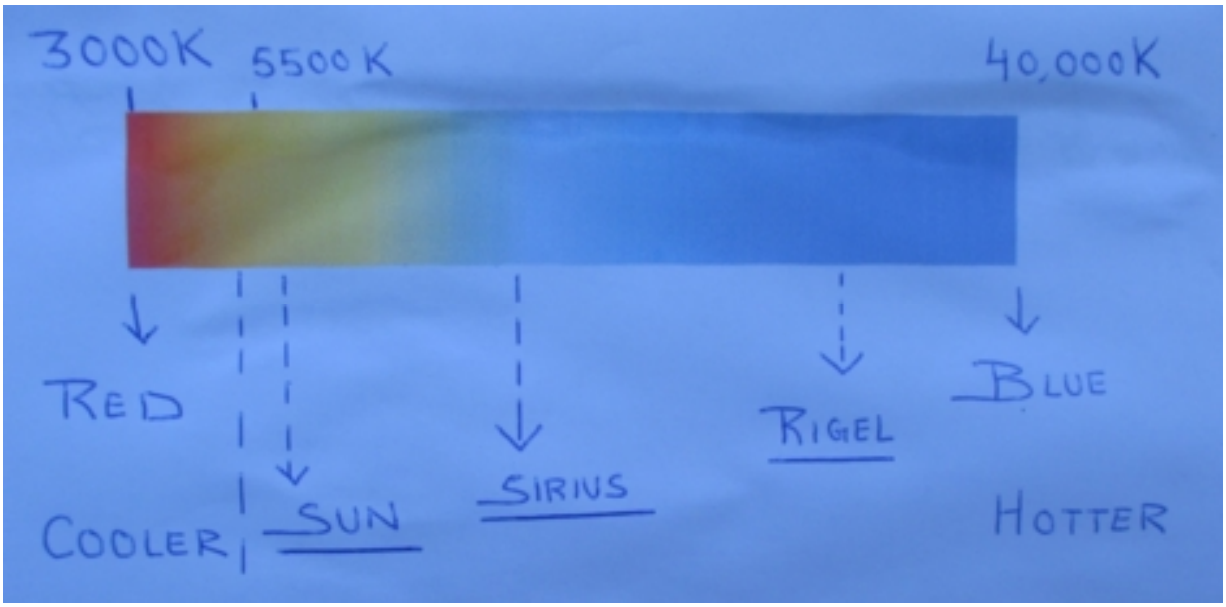
It turns out that particular elements in the star create particular patterns of lines. Once scientists knew the element responsible for a certain pattern, they can find out what elements are present in the star.

From studying the spectrum of the sun, scientists have been able to detect 67 elements present in it, including Hydrogen, Helium, Oxygen, Neon, Sodium, Iron… Amazing!

Spectrum from the Sun



D1 and D2 are the double Sodium lines while C and F represent Hydrogen.



By constructing a Z-Bot, citizen scientists, students, and explorers can have a very powerful tool in their hand to study composition and temperature of objects.