

The Sun

The Basics

Stars are a very important part of the universe we live in they make up about 5% of the total mass of the universe, now this value doesn't seem much but the remaining 95% is thought to be made up of dark energy and dark matter. The most important star to mankind would be "Sol" this is the star that Earth orbits, you probably know it better as "The Sun". This celestial body is the driving force behind the creation and behaviour of our solar system and as a result, the life within it (currently only known to be found on Earth). It seems that stars are actually very important as without them you would be not alive to read this. That being the case I thought it would be best to discuss stars and there features in an attempt to understand something that is so vital to our existence.

Vital Stats

The Sun is our nearest star, it is the one that the Earth and all the other planets in the solar system orbit, it is the centre of our solar system and it provides everything with energy, energy that it radiates as a result of internal nuclear reactions. As a result of the sun being so close (So close that it is the only star that can be seen as a disc, all other stars can only be seen as a point of light!!!) scientists have been able to gather lots of information about it which has given us a detailed insight into the operation of these celestial bodies. The Sun has the following statistics

Distance from Earth - 150×10^6 km or 1AU

Radius - 6.95×10^5 km

Mass - 1.99×10^{30} kg

Luminosity - 3.8×10^{26} Watts

Temperature - 5770K or 3043°C

Age - 4.5×10^9 years

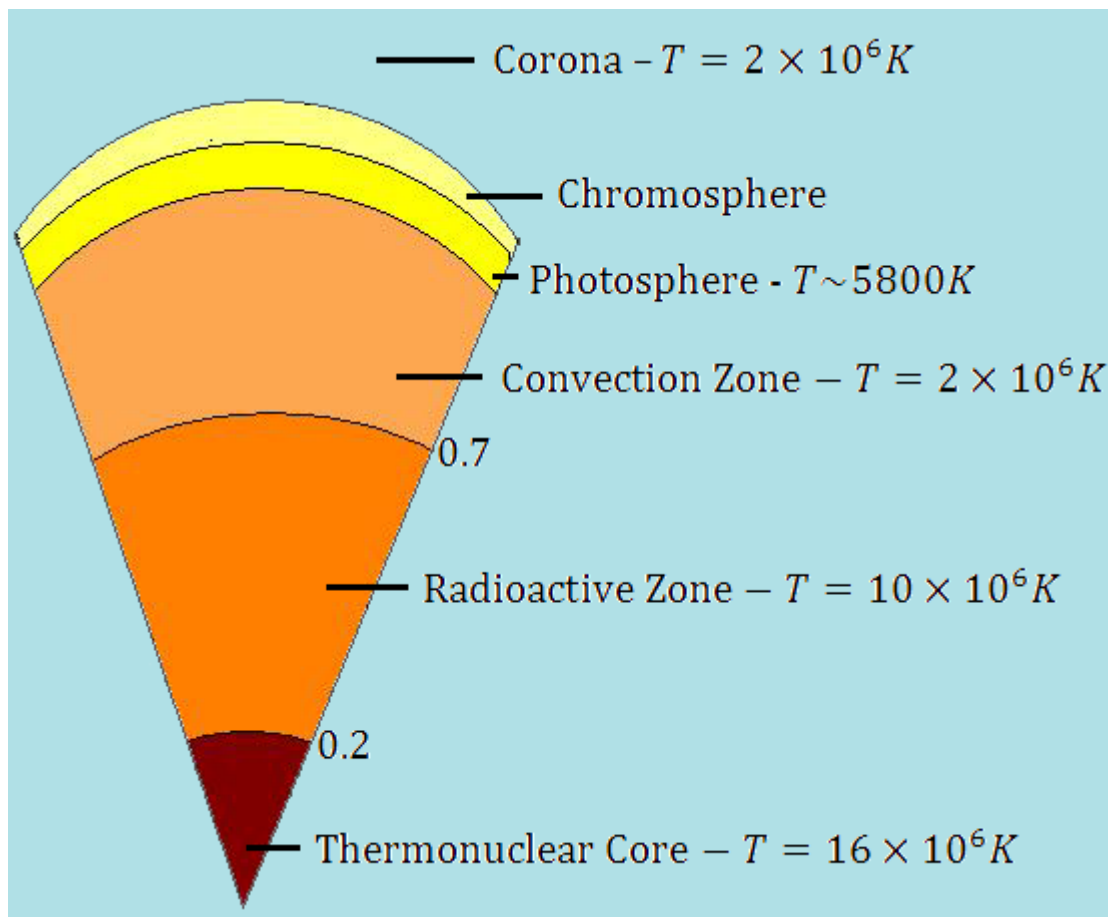
Compostition - 74% Hydrogen, 24% Helium, 2% Other

We have been able to gather these details because the Sun is so close to earth and we can measure these properties without the error that is introduced when trying to measure these details of other stars. As a result of this the Sun has become our Model star. After further study of the cosmos is also turns out that our star is remarkably average which is a good thing if you think about it, as it means that the

understanding we have achieved about the workings of our star apply to a lot of other stars out there in space. We will now explore this understanding of our sun.

Solar Construction

If you have ever observed the sun using a solar scope (a special telescope that allows you to view the sun without melting your eyes) or seen pictures of the Sun you may have noticed it looks like a giant ball of fire. This is on a very simple measure pretty much what the sun is, the truth is that it is a little more advanced than this. The sun uses a process called nuclear fusion in order to generate massive amounts of energy. The Sun's construction is based around a few layers or zones of activity, it is within these zones that all the important actions responsible for this energy generation happen.



As you can see The Sun is made up of 5 distinct layers plus the Corona. Each of these layers has a specific role to fulfill in order to ensure the correct operation of

The Sun. The thermonuclear core is where all the nuclear reactions that power the sun take place. The radioactive zone is essentially a layer of hot gas or plasma, that is heated by the absorption of the photons emitted by the reactions taking place in the core. These photons are absorbed and reemitted many times, until they eventually diffuse into the convection zone. The convection zone is a layer that is responsible for heat transfer. The photons are absorbed at the bottom of the layer where convective currents of gas are formed that flow upwards towards the photosphere. As the hot gas reaches the photosphere it releases photons (This is the light emitted by the sun) and cools as the gas flows back towards the centre of the sun. The photosphere is the layer of the sun we can "see". This is where all the photons that make up the light we can see is emitted from. The chromosphere lies on top of the photosphere and is a layer of slightly less dense gas, this is the layer that many of the solar phenomena such as prominences and spicules (we will discuss these later). The last layer on this diagram is the solar corona, this is basically a hot gas atmosphere that surrounds the sun. The corona extends millions of kilometers into space, and is heated to hotter than the surface of the sun. The method and physics behind how the corona gets so hot, is so far unknown and further tests are going to be conducted in order to discover the science responsible.

Source: <http://www.physicsforidiots.com/thesun.html>