

THE ADSTOCK SCIENCE CLUB



For those of you who frequently read, listen to or watch Science Fiction you will probably not be taken aback by some of the strange ideas and theories coming out of the world of science. For those who are not so familiar I thought I might take this opportunity to offer some enlightenment. Many of the strangest ideas, in fact, date back to the 50's and before. Take Black holes for instance, the concept of a black hole dates back to 1783 when a chap, John Mitchell, conjectured that there might be objects massive enough for their escape velocity to be greater than that of the speed of light. In other words you would have to accelerate to over 300,000 kilometres per second to be able to break free from that objects gravitational pull. John Wheeler in 1964 coined the term "black hole". Nowadays scientists consider black holes to be standard fixtures at the centre of just about every galaxy in existence. Black holes are formed by massive stars, about 15 to 20 times the mass of our Sun, which have collapsed, through the remorseless force of gravity, to a point, the so called singularity. Around this singularity at some distance is an area known as the event horizon. Anything, matter, light, you, me or a space ship that enters the event horizon basically disappears from our universe and will never be seen again. Nothing except a strange type of radiation known as Hawking radiation, named after Professor Stephen Hawking at Cambridge University, can escape from the inside of a black hole.

There's another strange concept, Hawking radiation. This effect scientists believe can be partially explained by a process called Quantum Tunnelling which allows subatomic particles, such as protons, neutrons, electrons etc. to spontaneously disappear from one location and then to instantaneously reappear in a totally different location without having to bother travelling the intervening distance through normal space. This effect is used extensively in modern day electronic devices, transistors in particular, which go to make up the chips used in all modern day computing devices.

Another strange effect associated with black holes is the nearer you get to a black hole the slower time seems to pass as seen by those situated further away. This is known as time dilation and is not only associated with black holes but is something that has to be taken into account by those designing one of the most popular and widely used bits of technology today, the satnav. You see, gravity, whether from a black hole or from a lesser body such as the Earth, affects the rate at which time passes. It is a well-known and well tested fact that time passes at a slower rate at the Earth's surface than for those objects in orbit around it, such as satellites. The clocks within GPS satellites for instance, run at a slightly faster rate than those in your satnav. The effect is not large but is large enough to cause problems. GPS satellite clocks have to be continuously tweaked to keep them synchronised with those on earth otherwise you may find your satnav giving you some very strange and potentially dangerous directions.

Time dilation can also be achieved by other more down to earth means. The Adstock Science Club will be attempting experiments to demonstrate this effect by the judicious use of alcohol during our final meeting this year, which will be on Friday 13th December, so what can go wrong? Of course, if necessary, it is possible to mitigate some of this by ingesting copious quantities of caffeine. Both procedures require specialised supervision and we'll let you know of our results sometime in 2014.

From all of us at TASC have a Happy Christmas and a Great New Year.

Marius Stuart

01296 712 561

marius.stuart@btopenworld.com