U3A Astronomy Meeting – 26th June 2009

News

Lunar Reconnaissance Orbiter

On 18/6 the LRO was launched by NASA. It's a very ambitious mission, looking both backward (geology of the Moon, sites where Apollo astronauts landed, sites where unmanned spacecraft touched down, etc) and forward (places with water ice, possible landing sites for future manned and unmanned missions).

Shuttle Endeavour

The shuttle should have been launched towards the ISS for an important and complicated mission on Saturday 13/6, but fuel leaks led to postponements, first of a couple of days each, and finally until 11th July. This latest postponement was necessary as the *window* for launching the shuttle towards the Space Station had passed. A launch can only take place when the launch pad in Florida lies in the plane of the Space Station's orbit.

The mission will be very special as it is the first time 7 astronauts will join a Space Station crew of 6! But it's not only the large number of people that's going to make this mission into something never seen before, but also the very full program. With the shuttle program ending next year, NASA has tried to pack as many things as possible into this mission. During five space walks quite impressive jobs are going to be done, such as the assembly of a Japanese experiment platform, and the replacement of six batteries in the oldest solar arrays of the ISS.

Solar eclipse

On the 22nd of July a full solar eclipse will happen in a band running from India towards China and Japan. A partial eclipse will be visible in bands on either side, but unfortunately nothing will be observable in Europe.

The eclipse is very special because of its long duration. Usually eclipses last for some 2-3 minutes, as the Moon and the Sun appear approx. the same size as seen from Earth (Sun's diameter = 400 x the Moon, but the Sun is 400 x further away). But this July eclipse will last almost 6 minutes (maximum possible is 7.5 min). This is because the size of the Moon as we see it from Earth varies by some 30% (its orbit around the Earth being slightly elliptical), and during this eclipse the Moon will be near *perigee* (=nearest to Earth) and thus at its biggest.

Miscellastronomy

Motion

Motion or movement is always relative, always in relation to something that does not move. When we walk at 5 km/h or drive at 70 km/h, these speeds are related to the stable and motionless surface of the Earth. Galileo was the first to realize the relativity of motion. He wrote: *'Imagine two boats – each travelling at a steady speed on a perfectly flat sea without any shoreline in sight. Then it is impossible to see which boat moves at what speed in which direction.'*

Galileo realised that the story of the ships at a sea without a shoreline also applies to the Universe: no shoreline either!

So, when sitting on Earth, it may seem that there is no motion or movement at all. BUT:

- we spin around Earth's axis, at the equator at c.1675 km/h, at our latitude at about 1070 km/h.
- the Earth orbits the Sun in a year's time at a speed of about 30 km/sec or 108,000 km/h.
- the Sun and the whole Solar System orbit the centre of the Milky Way in about 250 mln years at a speed of 217 km/sec or 780,000 km/h.
- the Milky Way moves towards the Andromeda galaxy (or vice versa!) at some 88 km/sec or 317,000 km/h.

Etcetera! The Milky Way and Andromeda belong to the 'local group' of galaxies, and this group moves again in relation to other groups.

We can only conclude that in the Universe at large everything is in motion at all scales of size, and stillness is an illusion!

Space Junk

We know that large quantities of 'space junk' are orbiting the Earth, in a great variety of sizes. A special US institution routinely tracks all pieces of junk larger than about 10 cm. They know the whereabouts of some 18,000 objects. And then there are of course many untracked smaller ones. All this material can lead to dangerous situations for astronauts in space, especially in the ISS. Given the enormous speeds at which these things move through space, also the small ones can cause great disasters.

Apart from the junk and rubble, there are, of course, also an enormous number of satellites orbiting the Earth. In the beginning of this year there were 417 satellites orbiting between 160 and 2000 km, so-called *LEO's* or Low Earth Orbit Satellites, *plus* 47 *MEO's* – between 2000 and 36,000 km altitude, and 351 *HEO's*; total: 815.

In February of this year two of these satellites, both communications satellites, one American and an (old) Russian one, collided at 790 km above northern Siberia. Shortly afterwards some 600 pieces of debris were counted.

Short items

- In 1901 sponge divers near a small Greek island recovered the corroded remains of a 2000 years old bronze instrument from a shipwreck. After years of study scientists have managed to decipher the inscriptions on the device, which turned out to have been used to calculate the movements of the Sun, the Moon and planets.
- 'Saturn's rings are forever.' Until quite recently it was believed that the rings were just 100 mln years old (= very young compared to the 4.5 bn years the SS has existed so far), and that they would not last forever. Now it has been discovered by American astronomers that the rings contain much more material than was believed, that they are probably billions of years older than we had thought and that they can last for billions of years more.
- This year is the *International Year of Astronomy,* based on the 400th anniversary of Galileo's first use of the telescope for astronomical purposes. With it, he discovered the four largest moons of Jupiter, spots on the Sun, mountains and 'seas' on the Moon and many other important things. The strange thing is, however, that Galileo in letters to his friends and relatives regularly complained about his deteriorating eyesight. Scientists have now asked the authorities for permission to exhume Galileo's body and to take samples of his DNA in order to find out more about this puzzle.
- Before long *space tourism* will become a reality. Virgin's director Sir Richard Branson has developed a big new aircraft, which will carry a small spacecraft – for six passengers and two crew – to an altitude of 50,000 ft or 15 km, where it will be launched for a flight to 360,000 ft or almost 110 km – the edge of space. There the tourist can experience 4-6 minutes of weightlessness. The total trip will last 3.5 hours and will cost at least £100,000 per person.
- Another wonderful possibility for real space enthusiasts will appear next year when the space shuttle will be retired and NASA plans to sell off the remaining shuttle fleet: *Discovery, Atlantis* and *Endeavour.* Each has flown some 7 mln miles. They will cost over
- £ 40 mln apiece, and should you buy one, don't imagine that you will then be able to fly to the Space Station, as the engines will be removed before sale. The latest news about the famous *Flat Earth Society* – There are still people – probably thousands, mostly in the USA and Britain - who are convinced that the Earth is flat. Pictures of the Earth taken from the Moon, orbiting satellites etc. are, in the *Flat Earthers* view, just a fake, a matter of a worldwide conspiracy by space agencies, governments and scientists. Their world map has the North Pole in the centre, with all the continents around it, apart from Antarctica, which lies in a wide circle around the edge, thus preventing anything from falling off. The whole idea appeared for the first time in Victorian England, where Christian thinkers decided to launch an attack on anti-biblical aspects of science. One of these people stated that Isaac Newton 'was either in liquor or insane.'