

U3Astronomy Meeting – 23 January 2009

Recent News

- The year 2008 lasted one second longer than normal, to make the very exact time of atomic clocks – the *Coordinated Universal Time* - match again with the astronomical time. The difference between the two is caused by small irregularities in the rotation of the Earth. When the difference between astronomical time and the time of atomic clocks has built up into a second, it is decided to add a 'leap second'. So the last minute of 2008 lasted 61 seconds. The last time a leap second was added was in 2005.
- 15th January saw the official opening of the International Year of Astronomy at a meeting in Paris. Its motto: '*THE UNIVERSE – yours to discover*'. Its main aim is to bring astronomy to a wider public, especially young people. It is organised jointly by the *International Astronomical Union* and *UNESCO*. Over 130 countries participate. Why 2009? = 400 years since Galilei for the first time used the recently invented telescope for astronomical purposes. Most important discovery: 4 moons orbiting Jupiter = proof that not everything orbits the Earth!
- Shuttle *Endeavour* landed safely on 30/11, after a successful two-week mission. It landed, however, not at the Kennedy Space Centre in Florida – because of bad weather - but in California. This meant that it had to be flown back to Florida by a special NASA Boeing-747.
- Early December a report was published about the accident that happened just nine days after the *Large Hadron Collider* was switched on in September. It was caused by a faulty connection between two of the 10,000 superconducting magnets, which bend the beams of particles in the 17-mile circular tunnel. About a tonne of the liquid helium was released, the temperature rose by about 100°, this led to a build-up of pressure and that caused most of the damage: over 50 magnets will have to be replaced. Apart from the repairs, work will also be carried out to prevent a repeat of such an accident: an early warning system and pressure-release valves will be installed. Total cost of repairs and refit: about £ 30 mln (LHC cost £ 4 bn).
- Last week NASA published news about finding large amounts of methane in 4 locations of Mars's atmosphere. Methane can be produced – as it is on Earth – by both geological and biological processes. It can be the product of biological activity (micro-organisms). This very important discovery tends to shift the search for life on Mars from looking for signs of life in the more or less distant past when water flowed on Mars, to signs of present life.

Review of 2008

The Solar System

- **The Sun** - In January a new Solar Cycle has started. Solar cycles last about 11 years. At the beginning we see a fast rise of solar activity (sunspots, solar flares etc.), with a maximum after about 3-4 years (in this case: 2011/'12 → possible problems for radio communications). After that the solar activity slowly fades to a minimum, at which moment the Sun's magnetic field reverses and a new cycle begins.

- **Mercury** - The spacecraft *Messenger* – on its 7 years journey before it will move into orbit around Mercury (2004-2011) had two fly-by's of Mercury in 2008, one in January and one in October, during which it mapped large parts of the planet which had been unknown so far.

- **Mars** - Much new information gathered about Mars in 2008.

The *Mars Reconnaissance Orbiter* (April 2006) 'saw' large avalanches in the North Polar region, it discovered ice sheets of up to half a mile thick and it found out that Mars must have had large amounts of water, as the landscape shows obvious remains of lakes and rivers.

In May the *Phoenix* Mars lander came down in Mars' s North Polar Region. One of the things it found during its six months active life were small quantities of water ice.

The two Mars rovers *Spirit* and *Opportunity* continued to work after (this month) five years! *Opportunity* descended into the famous Victoria crater, studied its walls, then climbed out of the crater again and is now on its way to another one.

Research projects

- **The ISS** – The International Space Station underwent various extensions, such as two new laboratories: ESA's *Columbus* and the Japanese *Kibo laboratory*.

New was also the visit of the unmanned cargo-spacecraft *Jules Verne*

- **The Hubble Space Telescope** - Should have had a service and extension mission in October, but shortly before that would have been launched, the telescope stopped sending pictures to Earth. In the meantime it has resumed sending material to Earth by using its back-up instruments, but the service mission will at the earliest take place in May this year.

- **The Large Hadron Collider** - (see above).

The search for (life on) exoplanets

During 2008 some 50 new exoplanets were discovered. The total now stands at around 335. Almost all of them were discovered through indirect methods, but in the past year for the first time photographs were taken of exoplanets.

Meteorite threats

In January an asteroid measuring about 600 x 150 metres passed the Earth at a distance of only about 540,000 km – about 1.5 times the distance Earth-Moon. If it had struck the Earth, it could have caused a major disaster.

Then in October another meteorite exploded over Sudan.

Highlights in 2009

- The 21st Century's longest lasting solar eclipse on 22nd July. It will last for about six minutes, as on that day the Moon is relatively near to the Earth (the apparent size of the Moon as seen from the Earth varies by 14%).

- Saturn's 'ring plane crossing' on 4/9. Twice during every 29-year orbit of Saturn around the Sun, we pass through the plane of the rings, which can then only be seen as a thin line (they are not thicker than about 1 km).

