

## U3Astronomy meeting 25<sup>th</sup> January 2008

### **REVIEW 2007**

#### Search for 'Exoplanets'

First discoveries in the mid-nineties. Two reasons: (1) to find Earth-like planets (with life?) and (2) – to understand better how our SS formed. Present 'score': over 270.

Two important steps forward in 2007: 1 - A planet was discovered only 50% larger than Earth (most of the other ones so far are gas-giants) and with the right temperature to contain water. 2 – A fifth planet was discovered orbiting one star: begins to look like a real Solar System !

#### 'New Horizons' flew by Jupiter

NH was launched in 2006 to study *Pluto*. On 28-02-07 it flew by *Jupiter*. The 'gravitational slingshot', caused by Jupiter's enormous gravitational pull, increased NH's speed from 58,000 to 72,000 km/h, thanks to which it will arrive at *Pluto* in 2015, otherwise in 2020. Flying past *Jupiter*, NH made interesting new discoveries and took wonderful pictures, for instance of the very active volcanoes on some of the 4 'Galilean' moons, and further of the enormous atmospheric storms on *Jupiter* itself.

#### MARS

Further search for water (and life). There is plenty of water, enough to flood the whole planet, but all in polar ice caps and permafrost soils. There is no doubt that millions of years ago there was plenty of water on Mars, even oceans. The Mars Rover *Spirit* recently found evidence of the presence of water in the past. *Spirit's* twin *Opportunity* has descended into the big Victoria crater, and hopes to find further traces of the past presence of water while studying the crater's walls.

#### Shuttle 'Atlantis' + 'Columbus' to ISS

The launch of shuttle *Atlantis* + *Columbus* (= ESA-built new laboratory) was planned for 6/12/2007. However, there were problems before the launch and it had to be postponed several times as sensors on one of the external fuel tanks switched off inexplicably and had to be replaced. The launch was first postponed until 24th January and eventually until 7th February.

### **THE NEW YEAR**

#### 'Messenger' past MERCURY

Launched in August 2004 to orbit and study the innermost planet Mercury. So far Mercury was only visited by *Mariner-10* in 1974/5. Problems with bringing a spacecraft in orbit around Mercury: (1) the spacecraft has to be *slowed down*, and (2) it is very hot on/around Mercury.

It was slowed down already by one fly-by of Earth and two of Venus, and now it will have to fly by Mercury three times. The first of these three fly-by's took place on 14/1, when it took pictures of so far unknown regions of Mercury. *Messenger* will finally come into orbit in March 2011.

#### Further exploration of the MOON

In April India will launch the lunar orbiter *Chandrayaan*, in October to be followed by the NASA *Lunar Reconnaissance Orbiter (LRO)*. They will both have *polar* orbits (not done so far).

*Chandrayaan* will produce a mineralogical map and a detailed topographical map of the Moon. The NASA *LRO* will concentrate on the polar regions of the Moon, as these are the favoured regions for future manned missions and/or bases.

#### Telescopes in space

On 31/07 ESA will launch its *Herschel Space Observatory*, fitted with a 3.5 metre infrared mirror – the largest observatory of this type in space. On 07/08, NASA will send its shuttle *Atlantis* to the *Hubble Telescope* for some risky but urgently needed repairs + replacement of batteries and cameras.

#### Eclipse year

In 2008 there will be two lunar eclipses and one solar eclipse:

- A total lunar eclipse in the early hours of 21/2 ('totality' between 3.01 and 3.51 am).
- A total solar eclipse on 01/08 in a band from Canada via Greenland, N.Russia and China. In the UK the Sun will be only partially obscured between 9.30 and 11 am (c. 11% in the S).
- A partial lunar eclipse in the evening of 16/08.

