**Dark Energy**

Speaker: Victor Leunens-de Maupeou

In physical cosmology and astronomy, dark energy is an unknown form of energy which is hypothesized to permeate all of space, tending to accelerate the expansion of the universe. Dark energy is the most accepted hypothesis to explain the observations since the 1990s indicating that the universe is expanding at an accelerating rate. Assuming that the standard model of cosmology is correct, the best current measurements indicate that dark energy contributes 68.3% of the total energy in the present-day observable universe. What exactly is dark energy is still a mystery.

**EDITORIAL - A New Telescope Needed!**

Well I guess it is official now. The Atkinson Telescope has been handed back to the Cawthron Institute. Actually at the moment that is only a symbolic gesture as the historic 5" Cooke is still under the dome at the Cawthron Atkinson Observatory. However measurement have been made so a box can be constructed to store the telescope in while it waits for a place where it can be on display. The removal of the telescope from the observatory at the Clifton Terrace School is supposed to be done by the end of the year. So it is likely that the last public viewing session with the Atkinson Telescope will be at the end of October, and then only if the weather cooperates. So when the next Star Party is scheduled in the new year which will likely be towards the end of February we will have an observatory minus a telescope. So there is some urgency in trying to get the fund raising going. So far as I write this the only funds promised or raised have come from members. Hopefully we will be successful in persuading other individuals and trusts that installing a 21st century telescope in our observatory is a worthwhile project to undertake. While we have set a tentative goal of raising a sum of $15,000 and purchasing a 14" Schmidt-Cassegrain telescope on a computer controlled mount, there are other options we could consider. We could do quite well with a mount that did not have the goto capabilities as long as it was robust, had a motor drive and digital setting circles were available for it. That might reduce the cost a bit, but these days the goto capabilities are pretty much standard in most high quality new mounts. If fund raising falls short we could aim for a telescope in the 10" to 12" size.

Robert Rea

UPCOMING EVENTS

27 October - Public Stargazing, Cawthron Atkinson Observatory
See The Leader for times.
2 November - Monthly Meeting
Topic: ??
Speaker: ??

1 December - Monthly Meeting
Social Night - Potluck and an astronomical potpourri

**Mass Makes the Star**

Astronomers have used the Hubble Space Telescope, Keck Observatory, and Canada-France-Hawaii Telescope to monitor 31 binary systems, consisting of brown dwarfs and low-mass stars, for almost a decade. The period and size of each pair's orbit determines each object's mass. Based on the sample, it has been confirmed that an object must have at least 70 times Jupiter's mass to ignite fusion; anything less is fated to brown dwarf status.

**Contributions**

Want to get published? Send your articles, comments etc. to
8 Regent Lane, Richmond or reamash@ihug.co.nz
**What's Up**

Canopus, the second brightest star, is in the southeast at dusk. It swings up into the eastern sky during the night. Canopus is a truly bright star: 13,000 times the Sun's brightness and 300 light years away. On the opposite styling is Vega, setting in the late evening. Vega is the fifth brightest star in the sky, It is 50 time brighter than the Sun but dimmed by its distance of 25 light years. In the southwest are 'The Pointers', Beta and Alpha Centauri, the top Pointer and the brightest star in that area, is the closest naked eye star. It is 4.3 light years away. It is a binary star; two sun-like stars orbiting each other in 80 years. A telescope magnifying 50 times will split the pair. Beta Centauri, like most of the stars in Crux, is a blue giant star, very hot and luminous, hundreds of light years away. Midway down the western sky is the orange star Antares marking the heart of the Scorpion. The Scorpion's tail loops up the sky in the evening, making a back-front question mark with Antares being the dot. The curved tail is the 'fish-hook' of Maui' in Maori star lore. The name Antares is Greek for 'rival of Mars'. Just now one can see how it got its name. Above and right of of the Scorpion's tail is 'the teapot' made by the brightest stars of Sagittarius. It is upside down in our southern hemisphere view. The Milky Way is brightest and broadest in Scorpius and Sagittarius. In a dark sky it can be traced down past the Pointers and Crux into the south. In the other direction, past Sagittarius, it tracks down the north sky to the right of Vega. The Milky Way is our edgewise view of the galaxy, the pancake of billions of stars of which the Sun is just one. The thick hub of the galaxy, 30,000 light years away, is within Sagittarius. The hub, often called 'the bulge', is mostly hidden by dust clouds in space. These interstellar dust clouds appear as dark gaps and slots in the Milky Way because the block our view of stars in that direction. A scan along the Milky Way with binoculars shows many clusters of new stars and some glowing clouds of left-over gas. There are many in Scorpius and Sagittarius and in the Carian region below Crux. The Large and Small Clouds of Magellan (LMC & SMC) look like two misty patches of light in the southeast sky. They are easily seen by eye on a dark moonless night. They are galaxies like our Milky Way only much smaller. The Large Cloud is about 5% the mass of our Galaxy and the small one is 3%. That is still many billions of stars each. The LMC is around 160,000 light years away and the SMC is about 200,00 light years away. They are thought to be satellite galaxies of the Milky Way, taking two billion years to orbit. On moonless evenings in a dark rural sky the Zodiacal light is visible in the west. At first glance it looks like late twilight. On closer inspection one sees a faint broad column of light passing through Libra. It is sunlight reflecting off meteoric dust in the plane of the solar system.

At dusk this month Jupiter is pretty low in the west and probably not worth trying to view through a telescope. As the month progresses it will come in to conjunction with the Sun and in November will reappear in the morning sky. Saturn is low in the northwest all of October, dropping lower every week. The ringed planet's brightness lingers at magnitude +0.5 all spring as it creeps eastward in Ophiuchus toward Sagittarius. The red supergiant Antares shines far - about 14 degrees - to the upper left of Saturn at nightfall in early October. Saturn's rings are at their maximum tilt of 27° this month. So this is probably the last month to enjoy good views of Saturn through a telescope. Uranus reaches opposition on October 20 and therefore is visible all night - though best observed when it is highest at about around 1 a.m. The blue-green world shines at magnitude 5.7 and appears 3.7° across in telescopes. Neptune shines only a sixth as brightly (magnitude 7.8) as Uranus because of its greater distance from both Earth and Sun. It was at opposition in early September, so now it's highest in mid to late evening. Uranus is in Pisces, about 2 degrees from Omicron Piscium; Neptune is just northeast of Lambda Aqaurri this month. Venus will be rising in the morning Sky with Mars about 3 degrees below it. The pair should be best on display a little more than an hour before sunrise, low in the east. Both planets are almost at their dimmest, with Venus at magnitude -3.9 and Mars at magnitude 1.8. They are also almost at their smallest, Venus appearing 11° wide and Mars 3.7°.

**Titan's Geologic History**

A topographic analysis suggests something has erased part of Titan's geologic past, perhaps recent tectonic activity. Drainage patterns will align with ancient topographic gradients, unless tectonism disrupts them. By blurring out small-scale features, it can be determined how often fluvial features “conformed” to the underlying topography. In general, surface material on Titan seems to migrate poleward — hydrocarbons in the atmosphere travel from mid-latitudes to the pole, and five out of six rivers drain to the poles. Titan's drainage networks follow the prevailing slopes in mid-latitude and equatorial regions, but not near the north pole.

**Double Black Hole**

Most large galaxies host central black holes, and those galaxies frequently collide, so supermassive duos should abound in the universe. Yet, despite observing thousands of galaxies, astronomers have only found one close pair of supermassive black holes, separated by 24 light-years in elliptical galaxy 0402+379. Now, a team has measured the plane-of-sky motions of this pair for the first time, making it the first visual black hole binary. Radio observations spanning 12 years were used to create sharp images of the galaxy's core at multiple frequencies. The set of images shows the motion across the sky of two bright spots of radio emission coming from each black hole's jets. The black holes' relative motion is 1,500 km/s, or 0.5% the speed of light. The duo will take some 30,000 years to complete a single orbit and millions of years to merge. Black hole mergers aren't guaranteed, but when the black holes are close enough they should emit gravitational waves that drive will their inward spiral.