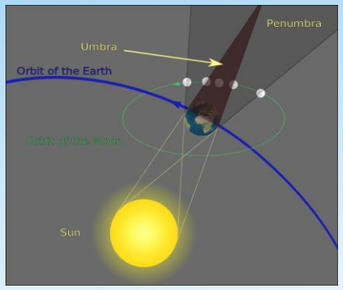
LUNAR ECLIPSE

September 28 2015 sees a total lunar eclipse. This is the fourth and last in a tetrad, a series of four total lunar eclipses that began in 2014. The eclipse starts at 01:11 and ends at 06:22, with totality occurring at 03:47.

So how does a lunar eclipse happen? A total lunar eclipse occurs when the Sun, the Earth and the Moon all line up and the Earth's shadow is projected on to the Moon. Essentially, the Earth will have two shadows; the penumbra and the umbra. When the Moon passes into the Earth's umbra, then there will be totality. Incidentally, with a bit of trigonometry, the umbra is 1.4million km long. At the distance of the Moon, it is 9000km wide.

For a total lunar eclipse, there has to be a full moon. Hang on, there's a full moon every 27.4 days, why don't they happen more often? This is because the plane of the Moon's orbital path around the Earth is inclined at an angle of 5° to the Earth's orbital plane, or ecliptic, around the Sun. The points where the two orbital planes meet are called lunar nodes and eclipses happen when a full Moon is at or near a lunar node.

Unlike a solar eclipse, where the Sun is blocked out by the Moon, the Moon is still visible during a lunar eclipse, appearing to be a red-orange colour. This is an effect known as Rayleigh Scattering and is caused



Schematic of the Earth, Moon and Sun alignment during a lunar eclipse.

Scattered red light through Earth's atmosphere makes the moon look red during a lunar eclipse

by the Earth's atmosphere which is 480km thick. Light, or other electromagnetic radiation, is scattered by particles very much smaller than the wavelength of the light. Colours that have shorter wavelengths like blue and violet get scattered more strongly. Indeed, it is this scattering of light that makes the sky look blue! However, colours with longer wavelengths are more able to pass through the atmosphere and are then refracted back onto the Moon's surface. This is also why we have beautiful sunrises and sunsets.

Really observant eclipse watchers will be able to see a light blue band on the surface of the Moon. You may be able to see this right at the beginning and just before the end of totality. It happens because the Ozone Layer scatters the red light but allows some of the blue light to pass through, refracting it on to the Moon.

Observing a lunar eclipse with your naked eye is very safe and very easy, even under street lamps but dark is best! So, hope for clear skies on the 28th and enjoy a total lunar eclipse. The next one won't occur until 31st January, 2018!

Mark Laughton
Technician on Astrocampus

EVENTS

September	17	Astrocampus Opening
	19	University Open Day
	21	University Open Day
	25	Yornight
	27/28	Lunar Eclipse
October	15	Astrocampus Opening
	29	Astrocampus Opening
December	15	Tim Peake Launch Date

For details on our open nights and to make a booking, please go to www.astrocampus.org.uk

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ASTRONEWS

ASTRO CAMPUS

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NEW STARS!

Like students everywhere, we can't believe the summer is over already! We are very excited to see our returning students and to welcome a new group of 30 Astrophysics students to the programme.

Summer has once again been a busy time on Astrocampus. We have installed a new mount for our largest optical telescope. It will allow us greater precision pointing to stars and more stability for the telescope and instruments. We also have been testing new spectrographs which allow us to study starlight in greater detail and (new for us) in the infrared spectrum too!

Over the first few weeks of term, Astrocampus will be busy as we train our new students how to use the telescopes. First year students have a brand new project this year investigating the brightness changes of Algol, the 'demon star'. Just like York astronomer John Goodricke 232 years ago, students will be challenged with measuring and explaining this variable. If you, or someone you know is interested in studying astrophysics why not come along and find out more at one of the university open days? Bookings can be made at www.york.ac.uk.

As the nights grow slowly longer we transfer to our winter observing season. Public open evenings will be fortnightly from October, with an earlier and later session to choose from. Reserve your place at www.astrocampus.org.

September also brings us Yornight - York's contribution to European Researchers night. Come along and discover more about spectroscopy, solar energy, telescopes and the life of a modern astronomer (me!). See all the events at yornight.com/2015.

Just a few days later we are treated to a lunar eclipse. Although not as rare as a solar eclipse, these eclipses of the moon are lovely to watch. See our feature article on the back cover to find out how to watch it.

Finally, a date for your December diary is the launch date for British Astronaut Tim Peake. Tim will be the first British ESA Astronaut and will be spending time on the International Space Station. You can follow him on twitter to get regular updates at @astro_timpeake.

All in all it feels like astronomy is really looking up!

Best Wishes and Clear Skies!

Dr. Emily Brunsden
Director of Astrocampus

UPDATE

Telescopes got BIG this summer, as the Astrocampus joined forces with the Science and Technology Facilities Council (STFC) to stage a five-day extravaganza. Nearly 2000 people joined us to celebrate York's Festival of Ideas 'Big Telescopes Exhibition'. Giant models showed off British science at its best; fascinating talks wowed us with fantastic facts; inflatable domes toured the night skies; and an array of hands-on activities inspired even the youngest of Scientists!

Photos taken by Mark Woodward, John Houlihan, Catherine Dunn

Katherine Leech
Outreach Officer