

WEYMOUTH ASTRONOMY

Sky Watcher

Volume 16, Issue 1
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Trips / Events

Ideas for trips and events
always welcome!

events@weymouthastronomy.co.uk

Society Meetings cancelled until further notice—Please check their websites for the latest schedule

In the meantime, the British Astronomical Association has moved their meetings to an online format. Live streamed on release and 'catch-up' on Youtube available. These webinars are Open to All.

<https://britastro.org/>

BAA live webinars, 7pm every Wednesday

<https://www.youtube.com/user/britishastronomical>

If you are interested in giving a talk or workshop, let the organisers know. They like to offer new titles in their programme line-up.



Recently I received a product information update from Photographer's Ephemeris (TPE). This excellent tool which is free to use online, although it has a paid version as well, is invaluable for lining up the *perfect shot* in photography. It illustrates the lighting directions as well as position locations for many events and how they relate to your specific location. <https://photoephemeris.com/>

Eclipse Map — 10 June 2021 Annular Solar Eclipse



If you haven't used it yet, it is worth having a look before the partial annular eclipse next month. Looking forward to reading your observation reports, sketches and photographs of the event! Until next time...SLK



Virgo's Galactic Harvest

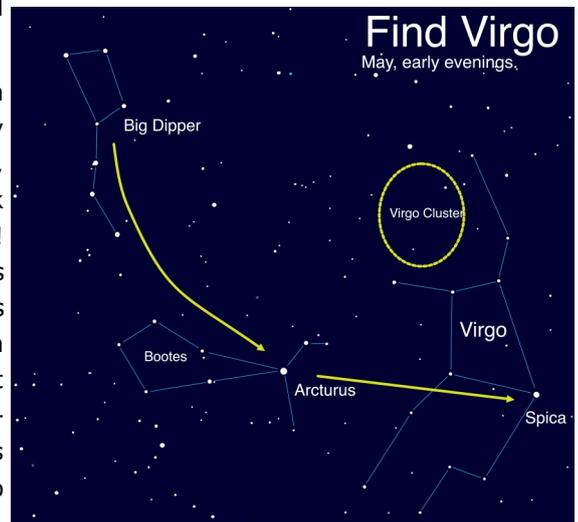
by David Prosper

May is a good month for fans of galaxies, since the constellation Virgo is up after sunset and for most of the night, following Leo across the night sky. Featured in some ancient societies as a goddess of agriculture and fertility, Virgo offers a bounty of galaxies as its celestial harvest for curious stargazers and professional astronomers alike.

Virgo is the second-largest constellation and largest in the Zodiac, and easily spotted once you know how to spot Spica, its brightest star. How can you find it? Look to the North and start with the Big Dipper! Follow the general curve of the Dipper's handle away from its "ladle" and towards the bright orange-red star Arcturus, in Boötes – and from there continue straight until you meet the next bright star, Spica! This particular star-hopping trick is summed up by the famous phrase, "arc to Arcturus, and spike to Spica."

This large constellation is home to the Virgo Cluster, a massive group of galaxies.

While the individual stars in Virgo are a part of our own galaxy, known as the Milky Way, the Virgo Cluster's members exist far beyond our own galaxy's borders. Teeming with around 2,000 known members, this massive group of galaxies are all gravitationally bound



Find Virgo by "arc to Arcturus, then spiking on to Spica." Please note that in this illustration, the location of the Virgo Cluster is approximate - the borders are not exact.

WAC Upcoming Events:

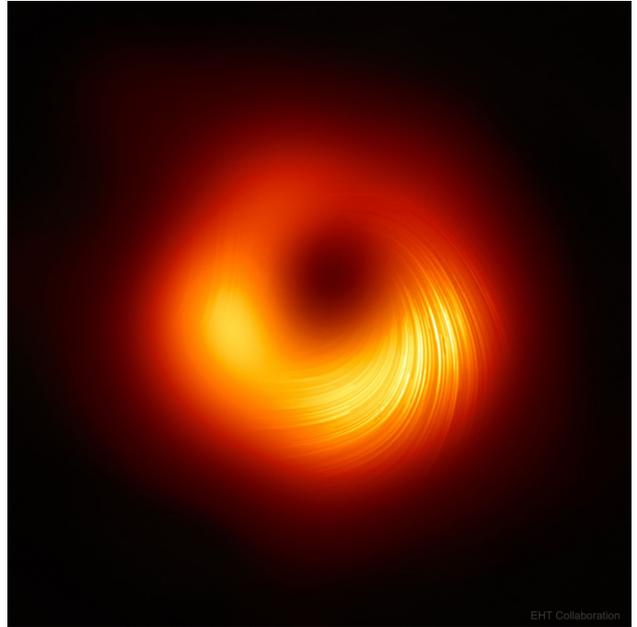
	Watch website for online options.
11 June	Bob Mizon - Hours with the Night Sky
9 July	Bill Coombes—The ISS
14 Aug	No Meeting—Summer Break

Virgo (more!)

to each other, and are themselves members of the even larger Virgo Supercluster of galaxies, a sort of “super-group” made up of groups of galaxies. Our own Milky Way is a member of the “Local Group” of galaxies, which in turn is *also* a member of the Virgo Supercluster! In a sense, when we gaze upon the galaxies of the Virgo Cluster, we are looking at some of our most distant cosmic neighbors. At an average distance of over 65 million light years away, the light from these galaxies first started towards our planet when the dinosaurs were enjoying their last moments as Earth’s dominant land animals! Dark clear skies and a telescope with a mirror of six inches or more will reveal many of the cluster’s brightest and largest members, and it lends itself well to stunning astrophotos.

Virgo is naturally host to numerous studies of galaxies and cosmological research, which have revealed much about the structure of our universe and the evolution of stars and galaxies. The “Universe of Galaxies” activity can help you visualize the scale of the universe, starting with our home in the Milky Way Galaxy before heading out to the Local Group, Virgo Cluster and well beyond! You can find it at bit.ly/universeofgalaxies. You can further explore the science of galaxies across the Universe, along with the latest discoveries and mission news, at nasa.gov.

The first image of a black hole’s event horizon was taken in the center of one of the most prominent galaxies in Virgo, M87! This follow up image, created by further study of the EHT data, reveals polarization in the radiation around the black hole. Mapping the polarization unveils new insights into how matter flows around and into the black hole - and even hints at how some matter escapes! More details: apod.nasa.gov/apod/ap210331.html Credit: Event Horizon Telescope Collaboration

**Spacecraft Reveal New Details of Magnetic Reconnection** By Morgan Rehnberg 15 Feb 2021

EOS

The space environment around Earth is characterized by interactions between Earth’s magnetic field and nearby **plasma**. A key physical process in these interactions is **magnetic reconnection**, in which two adjacent field lines break and each half subsequently joins half of the other broken line to form new field lines. **Reconnection** releases potential energy stored in the field lines, transferring it to the surrounding plasma in the form of particle acceleration.

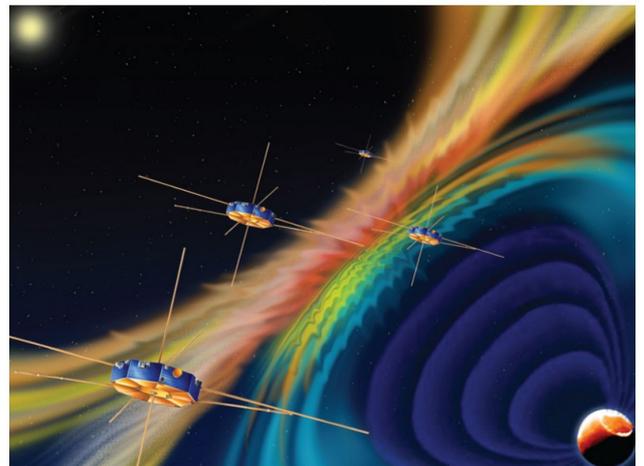
NASA’s **Magnetospheric Multiscale (MMS) mission**, which launched in 2015, studies magnetic reconnection **using four small spacecraft** that orbit in formation. *Turner et al.* describe MMS observations of a reconnection event that occurred on 11 July 2017. At the time of the reconnection, MMS was passing through the electron diffusion region (EDR), an area tens of kilometers in size in which reconnection of magnetic field lines occurs.

Prior to the reconnection event, MMS observed no energetic electrons in its vicinity. Then it recorded two bursts of energetic (greater than 50 kiloelectron volts) electrons within 5 seconds, the latter of which persisted for several minutes. During these bursts, higher-energy electrons arrived in the EDR first, followed by those with lower energies. The authors interpret this energy dispersion as evidence of electrons from a far-off reservoir flowing onto the newly formed field lines.

They also report that, strikingly, all four spacecraft did not observe identical particle distributions despite being very close together in space in comparison with the characteristic scale of motion of electrons with energies of 50 or more kiloelectron volts. This evidence of chaotic particle motion occurred despite the overall magnetic field in the region around MMS remaining stable for several seconds. Such particle distributions are typical of nonlinear particle acceleration.

The authors conclude that small-scale motions of electrons in the vicinity of a magnetic reconnection event can thus shed light on the magnetic topology in a region much larger than the area of observation and that magnetic reconnection may directly accelerate electrons to relativistic energies. (*Geophysical Research Letters*, <https://doi.org/10.1029/2020GL090089>, 2021)

<https://eos.org/research-spotlights/spacecraft-reveal-new-details-of-magnetic-reconnection?>



Reconnecting magnetic field lines, which accelerate energetic electrons, are illustrated here along with the spacecraft of NASA’s Magnetospheric Multiscale mission. Credit: Southwest Research Institute, CC BY 2.0

Constellation Cookies

Let's make Constellation Cookies. You'll need:

- **sugar cookies**, square or circle will work
- **royal icing** divided and tinted dark blue (using AmeriColor Navy Blue mixed with Super Black) and light gold (store the gold icing in the fridge until day 2)
- couplers and tips: #2, #1
- disposable icing bags
- squeeze bottle
- toothpicks
- constellation print-outs (printed to fit your cookie size)
- push-pin
- **meringue powder**
- small paintbrush
- disco dust

Step 1



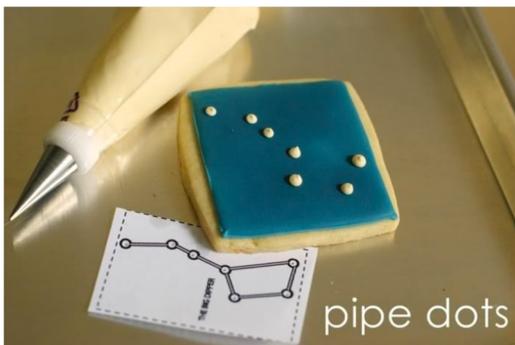
Step 2



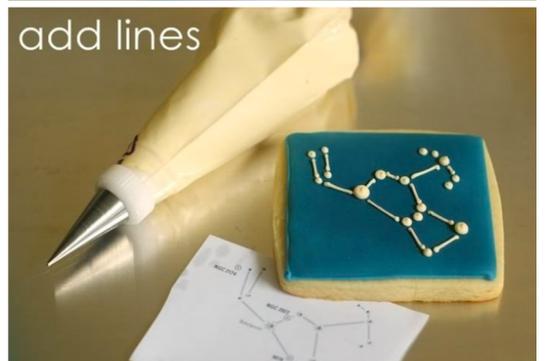
Step 3



Step 4



Step 5



Add glitter
(disco dust)

Job Done!

