



### Trips / Events

Ideas for trips and events  
always welcome!

[events@weymouthastronomy.co.uk](mailto:events@weymouthastronomy.co.uk)

- ◆ 16 Dec CADAS—Steve Tonkin: *Star of Bethlehem and Christmas social*
- ◆ 5 Jan WAS—Members Ten Minute Talks
- ◆ 20 Jan CADAS—Cosmic Miscellany—James Fradgley
- ◆ 2 Feb WAS—Tablet Astronomy—Lillian Hobbs
- ◆ 17 Feb CADAS—A life on Mars—Bud Budzynski
- ◆ 1 Mar WAS—Apollo Science Packages—Keith Wright
- ◆ 16 Mar CADAS—Dawn of the Solar System—Chris Starr
- ◆ 5 Apr WAS—Eclipses—Chris Bowden
- ◆ 20 Apr CADAS—Names in the Sky—Bob Mizon

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.

### WAC Upcoming Events:

- 8 Jan—Members 10 Min Talks
- 12 Feb—Open Night for New Members
- 11 Mar—Calendars, Cultures and Clocks—James Fradgley
- 8 Apr—TBA
- 13 May—The Names of the Stars—Bob Mizon

### More to come!

Plans for informal viewing nights will take place after the monthly meetings, weather permitting.

This month features one of the best meteor showers of the year. The Geminids! The peak is 13-14 Dec which is during a waxing crescent moon this time. Meteors from this shower will be visible from 4—17 December. The shower's radiant appears to emanate from the constellation Gemini. Up to 120 meteors per hour are expected to be seen from a dark site. The origin of this shower is not a comet but an asteroid - 3200 Phaethon. The asteroid takes about 1.4 years to orbit around the Sun.

Use URL <http://www.timeanddate.com/astronomy/meteor-shower/geminids.html> to see the daily meteor shower guide for your location.

Look forward to seeing your photos, sketches and meteor shower counts for the newsletter next month.

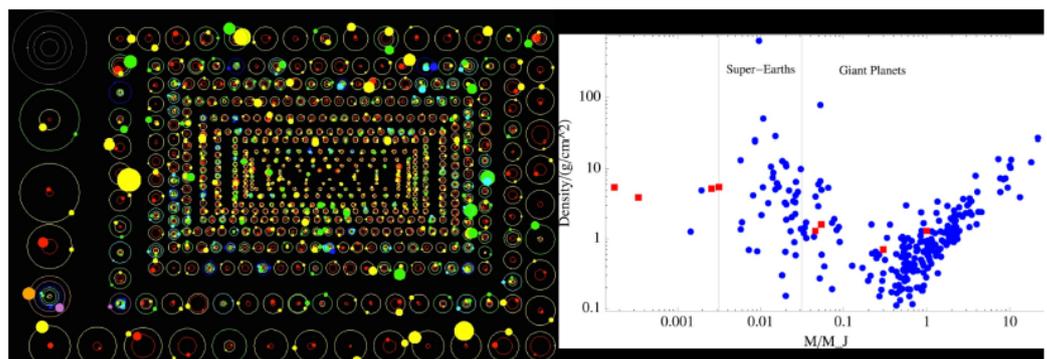
Until next month...clear skies and Happy Holidays to All! ~SK

### Our Solar System is Almost Normal But Not Quite By Ethan Siegel

It was just over 20 years ago that the very first exoplanet was found and confirmed to be orbiting a star not so different from our own sun. Fast forward to the present day, and the stellar wobble method, wherein the gravitational tug of a planet perturbs a star's motion, has been surpassed in success by the transit method, wherein a planet transits across the disk of its parent star, blocking a portion of its light in a periodic fashion. Thanks to these methods and NASA's Kepler spacecraft, we've identified many thousands of candidate planets, with nearly 2,000 of them having been confirmed, and their masses and densities measured. The gas giants found in our solar system actually turn out to be remarkably typical: Jupiter-mass planets are very common, with less-massive and more-massive giants both extremely common. Saturn—the least dense world in our solar system—is actually of a fairly typical density for a gas giant world. It turns out that there are many planets out there with Saturn's density or less. The rocky worlds

are a little harder to quantify, because our methods and missions are much better at finding higher-mass planets than low-mass ones. Nevertheless, the lowest mass planets found are comparable to Earth and Venus, and range from just as dense to slightly less dense. We also find that we fall right into the middle of the "bell curve" for how old planetary systems are: we're definitely typical in that regard. But there are a few big surprises, which is to say there are three major ways our solar system is an outlier among the planets we've observed:

- All our solar system's planets are significantly farther out than the average distance for exoplanets around their stars. More than half of the planets we've discovered are closer to their star than Mercury is to ours, which might be a selection effect (closer planets are easier to find), but it might indicate a way our star is unusual: being devoid of very close-in planets.
- All eight of our solar system's planets' orbits



Images credit: NASA / Kepler Dan Fabricky (L), of a selection of the known Kepler exoplanets; Rebecca G. Martin and Mario Livio (2015) *ApJ* 810, 105 (R), of 287 confirmed exoplanets relative to our eight solar system planets.



## Almost Normal (continued)

are highly circular, with even the eccentric Mars and Mercury only having a few percent deviation from a perfect circle. But most exoplanets have significant eccentricities, which could indicate something unusual about us.

- And finally, one of the most common classes of exoplanet—a super-Earth or mini-Neptune, with 1.5-to-10 times the mass of Earth—is completely missing from our solar system.

Until we develop the technology to probe for lower-mass planets at even greater distances around other star systems, we won't truly know for certain how unusual we really are!

## In the News: Weather finally cooperates with NASA, ISS resupply launch successful

7 Dec 2015

by Richard Chirgwin of theregister.co.uk

A couple of Raspberry Pis are on the way to the International Space Station at last, after a resupply launch delayed three times due to bad weather finally hauled itself into orbit. The original launches suffered rain last Thursday and high winds on Friday and Saturday, but things finally went smoothly Sunday evening for the Cygnus launcher. The Raspberry Pis are joining Brit astronaut Tim Peake, with students last year offered a competition to have some of their code run in space under the Astro Pi competition.



As Raspberry explained back in May, the space-bound Pis needed some fairly dramatic case-mods for the space environment. “There is a rule that any surface, that the crew can touch, must not reach or exceed 45 degrees Celsius. Our Jonathan Bell and SSTL’s Nimal Navarathinam did extensive thermal simulations to work out the requirements”, the company says. Without gravity, convection isn't as efficient on the ISS as on Earth (it relies solely on fan-driven air-flow). Having an all-over heatsink helps avoid any part of the case exceed that 45°C upper limit.

The Cygnus is currently in orbit and due to be collected by the ISS on 9 December.

## Members Images—



Amazingly enough in the spell of sunshine on the 6 December, a few solar images were obtained. The Sun was at 9.8 degrees for the Ha and 10.2 degrees for the CaK according to The Photographer's Ephemeris.

<http://app.photoephemeris.com/>

Not very good seeing but some features are apparent. Some very nice prominences were visible in Hydrogen-alpha. Surprised to obtain images with the Sun so low but pleased with the results.

*Images taken by Sheri Karl from Aberdeen*

57.2°N 2.1°W

