

# THE STAR DIAGONAL

THE JOURNAL OF THE OGDEN ASTRONOMICAL SOCIETY



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## Meeting Announcement

Our monthly meeting of the Ogden Astronomical Society will be held on March 12, 2014 at 7:30pm at the Ott Planetarium. Dr. Stacy Palen will be our speaker.

## President's Message

Spring is just around the corner, one clear sign that spring is coming is the request for school star parties that are starting to come in. These star parties are a great opportunity to show people the night sky and get students excited about astronomy and science. These star parties attract students and their family's so it is not unusual to get 80 to 100 people attending them. I hope we can get the support we need from the club members for these important activities. Public outreach is an important part of what we do as an astronomy club. It really is a great feeling to show people the wonders of the night sky. We will post the dates and locations as soon as we have them worked out.

For our meeting this month we have a special treat, Dr. Stacy Palen will be speaking on the "First Results from ALMA: Chasing Molecules Around the Universe" ALMA is the Atacama Large Millimeter/submillimeter Array located in the Atacama desert of northern Chile.

I hope to see you there,  
Lee Priest

## OAS Minutes – February 2015

The monthly meeting of the Ogden Astronomical Society was held on February 12, 2015 at 7:30pm at the Ott Planetarium. President Lee Priest conducted the meeting.

### Announcements

- Science Olympiad 2/22
- St. George Feb. 19-22
- Curlew Mar. 20-22
- Dr. Palen will be our speaker next month
- Mar 28<sup>th</sup> Scouts at Whiterock bay.

- Feb 24. Lecture on Space Travel 7pm room 121.

We broke into small groups to work on questions for the Olympiad. Meeting adjourned at about 8:30.

## Star Parties

### Public

- 4/25 – Antelope Island
- 5/16 – Antelope Island
- 6/20 – Antelope Island
- 8/8 – Antelope Island
- 9/10–9/13 – Great Basin Astronomy Festival
- 9/19 – Antelope Island
- 10/17 – Antelope Island

### Requested

- 3/28- Scouts at Whiterock bay.

### Private

- 3/20-3/22 – Messier Marathon (Curlew)
- 4/17-4/19 – Curlew
- 6/11 – Annual BBQ at Doug’s
- 7/17-7/19 – Monte Cristo (many arrive by Weds or Thurs)
- 8/14-8/16 – Monte Cristo
- 10/9-10/11 – Messier Marathon (Curlew)

## St George

Here are some pictures from St. George.



Venus, Mars, Moon by Lee Priest



Virgin Star Party Site by Doug Say



Dave and Tracey by Doug Say



Dale Hooper looking at Jupiter by Doug Say

# The heavyweight champion of the Cosmos

By Dr. Ethan Siegel

As crazy as it once seemed, we once assumed that the Earth was the largest thing in all the universe. 2,500 years ago, the Greek philosopher Anaxagoras was ridiculed for suggesting that the Sun might be even larger than the Peloponnesus peninsula, about 16% of modern-day Greece. Today, we know that planets are dwarfed by stars, which themselves are bound together by the billions or even trillions into galaxies.

But gravitationally bound structures extend far beyond galaxies, which themselves can bind together into massive clusters across the cosmos. While dark energy may be driving most galaxy clusters apart from one another, preventing our local group from falling into the Virgo Cluster, for example, on occasion, huge galaxy clusters can merge, forming the largest gravitationally bound structures in the universe.

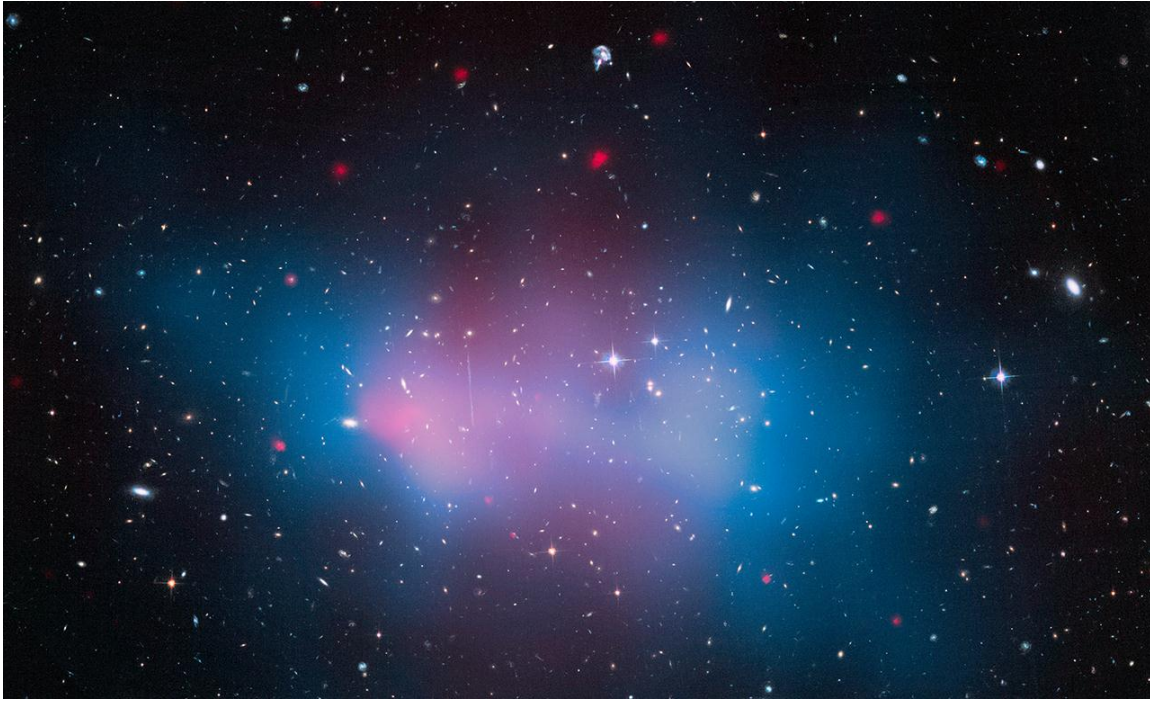
Take the "El Gordo" galaxy cluster, catalogued as ACT-CL J0102-4915. It's the largest known galaxy cluster in the distant universe. A galaxy like the Milky Way might contain a few hundred billion stars and up to just over a trillion ( $10^{12}$ ) solar masses worth of matter, the El Gordo cluster has an estimated mass of  $3 \times 10^{15}$  solar masses, or 3,000 times as much as our own galaxy! The way we've figured this out is fascinating. By seeing how the shapes of background galaxies are distorted into more elliptical-than-average shapes along a particular set of axes, we can reconstruct how much mass is present in the cluster: a phenomenon known as weak gravitational lensing.

That reconstruction is shown in blue, but doesn't match up with where the X-rays are, which are shown in pink! This is because, when galaxy clusters collide, the neutral gas inside heats up to emit X-rays, but the individual galaxies (mostly) and dark matter (completely) pass through one another, resulting in a displacement of the cluster's mass from its center. This has been observed before in objects like the Bullet Cluster, but El Gordo is much younger and farther away. At 10 billion light-years distant, the light reaching us now was emitted more than 7 billion years ago, when the universe was less than half its present age.

It's a good thing, too, because about 6 billion years ago, the universe began accelerating, meaning that El Gordo just might be the largest cosmic heavyweight of all. There's still more universe left to explore, but for right now, this is the heavyweight champion of the distant universe!

*Learn more about "El Gordo" here: <http://www.nasa.gov/press/2014/april/nasa-hubble-team-finds-monster-el-gordo-galaxy-cluster-bigger-than-thought/>*

*El Gordo is certainly huge, but what about really tiny galaxies? Kids can learn about satellite galaxies at NASA's Space Place <http://spaceplace.nasa.gov/satellite-galaxies/>.*



*Image credit: NASA, ESA, J. Jee (UC Davis), J. Hughes (Rutgers U.), F. Menanteau (Rutgers U. and UIUC), C. Sifon (Leiden Observatory), R. Mandelbaum (Carnegie Mellon U.), L. Barrientos (Universidad Catolica de Chile), and K. Ng (UC Davis). X-rays are shown in pink from Chandra; the overall matter density is shown in blue, from lensing derived from the Hubble space telescope. 10 billion light-years distant, El Gordo is the most massive galaxy cluster ever found.*