



# ASTRAL PROJECTIONS

May 2014  
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**APRIL MEETING:** Sam Micovic talked about the rapid accumulation of knowledge due to advanced space technology.

**MAY MEETING:** Ryan Knipple will talk about Astronomy on-line.

## Announcements

**COYLE FIELD ASTRONOMERS CLUB:** A message from John Endreson: Does anyone from ASTRA want to join the Coyle Field Astronomers club and needs help with logging onto the CFA website? Have you sent in your membership dues but haven't heard back yet and want to gain access to the observing field? I've volunteered to be the ASTRA administrator of the Coyle Field Astronomy club and will be able to get you logged onto the CFA website, help you download or provide you with the CFA's Bylaws, Membership Application form, and the Coyle Field R.O.U. "Rules of Use" forms. I will also be able to accept your signed membership forms and dues payment and issue you a temporary CFA field use license and gate combination while you wait for your membership to be processed. This will get you onto the field ASAP. Coyle Field Astronomers membership dues are \$30 per year. See John Endreson at the next meeting for more information.

## What's up This Month?

**ASTRONOMY DAY MAY 3:** Daytime Event Jake's Branch County Park. Come join us as we celebrate Astronomy Day. Safely observe the sun and see a comet making demonstration and various displays about astronomy and space. Saturday, May 3, 2014, 3:00 PM - 5:00 PM. Location: Jakes Branch County Park, 1054 Sunset Rd, Beachwood, NJ 08722.

Evening Observing Event Jake's Branch County Park. Come join us as we celebrate Astronomy Day. Observe the universe through our telescopes. Saturday, May 3, 2014, 7:30 PM - 11:00 PM. Location: Jakes Branch County Park, 1054 Sunset Rd, Beachwood, NJ 08722

**ASTRONOMY DAY MAY 10:** Daytime Event at OCC. During the daytime members of ASTRA will have various displays and demonstrations celebrating Astronomy Day at Ocean County College. Free Event Ocean County College Campus. Saturday, May 10, 2014, 10:00 AM - 4:00 PM. Location: Robert J. Novins Planetarium, 2001 College Drive, Ocean County College, Toms River, NJ 08754.

Night-time Event at OCC. At night the club will setup their telescopes on campus to share views of the planets and stars. We will explore the constellations and other celestial objects of the season. Free Event Ocean County College Campus. Saturday, May 10, 2014, 8:00 PM - 11:00 PM. Location: Robert J. Novins Planetarium, 2001 College Drive, Ocean County College, Toms River, NJ 08754.

Check the online message board on the date of the star party for up to date information on these events.



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## The Power of the Sun's Engines

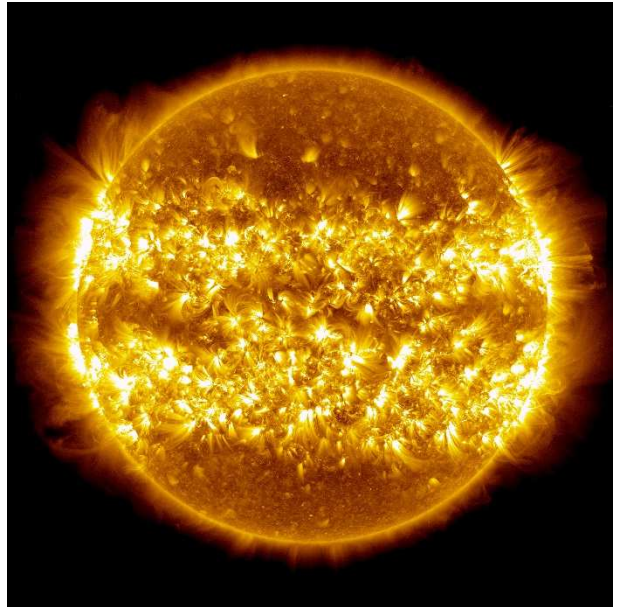
By Dr. Ethan Siegel

Here on Earth, the sun provides us with the vast majority of our energy, striking the top of the atmosphere with up to 1,000 Watts of power per square meter, albeit highly dependent on the sunlight's angle-of-incidence. But remember that the sun is a whopping 150 million kilometers away, and sends an equal amount of radiation in all directions; the Earth-facing direction is nothing special. Even considering sunspots, solar flares, and long-and-short term variations in solar irradiance, the sun's energy output is always constant to about one-part-in-1,000. All told, our parent star consistently outputs an estimated  $4 \times 10^{26}$  Watts of power; one second of the sun's emissions could power all the world's energy needs for over 700,000 years.

That's a literally astronomical amount of energy, and it comes about thanks to the hugeness of the sun. With a radius of 700,000 kilometers, it would take 109 Earths, lined up from end-to-end, just to go across the diameter of the sun once. Unlike our Earth, however, the sun is made up of around 70% hydrogen by mass, and it's the individual protons — or the nuclei of hydrogen atoms — that fuse together, eventually becoming helium-4 and releasing a tremendous amount of energy. All told, for every four protons that wind up becoming helium-4, a tiny bit of mass — just 0.7% of the original amount — gets converted into energy by  $E=mc^2$ , and that's where the sun's power originates.

You'd be correct in thinking that fusing  $\sim 4 \times 10^{38}$  protons-per-second gives off a tremendous amount of energy, but remember that nuclear fusion occurs in a huge region of the sun: about the innermost quarter (in radius) is where 99% of it is actively taking place. So there might be  $4 \times 10^{26}$  Watts of power put out, but that's spread out over  $2.2 \times 10^{25}$  cubic meters, meaning the sun's energy output per-unit-volume is just  $18 \text{ W} / \text{m}^3$ . Compare this to the average human being, whose basal metabolic rate is equivalent to around 100 Watts, yet takes up just 0.06 cubic meters of space. In other words, you emit 100 times as much energy-per-unit-volume as the sun! It's only because the sun is so large and massive that its power is so great.

It's this slow process, releasing huge amounts of energy per reaction over an incredibly large volume, that has powered life on our world throughout its entire history. It may not appear so impressive if you look at just a tiny region, but — at least for our sun — that huge size really adds up!



*Image credit: composite of 25 images of the sun, showing solar outburst/activity over a 365 day period; NASA / Solar Dynamics Observatory / Atmospheric Imaging Assembly / S. Wiessinger; post-processing by E. Siegel.*

*Check out these "10 Need-to-Know Things About the Sun":*

<http://solarsystem.nasa.gov/planets/profile.cfm?Object=Sun>

*Kids can learn more about an intriguing solar mystery at NASA's Space Place:*

<http://spaceplace.nasa.gov/sun-corona>



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**CELESTIAL EVENTS FOR MAY**

Mercury is visible in the evening sky and brightest the first part of the month. Venus is visible low in the E in the dawn sky. Mars is in Virgo in the evening sky. Jupiter is in Gemini – low in the western evening sky. Saturn is visible in Libra in the evening (at opposition May 10). Highlights for the month:

- 1 Aldebaran 2° S of Moon
- 4 Jupiter 5° N of Moon
- 7 First Quarter Moon
- 10 Saturn at opposition
- 11 Mars 3° N of Moon
- 12 Spica 1.7° S of Moon
- 14 Saturn 0.6° N of Moon  
Full Moon
- 15 Venus 1.3° S of Uranus
- 21 Last Quarter Moon
- 25 Venus 2° S of Moon
- 28 New Moon
- 30 Mercury 6° N of Moon

Credit: Observer's handbook



**CLUB TELESCOPES:** A.S.T.R.A. owns seven small telescopes:

- 6-inch Dobsonian (in need of repairs)
- 8-inch Dobsonian
- 80mm Celestron Refractor
- 120mm EQ AstroView Refractor.
- Lunt 35mm H-Alpha solar scope
- 8-inch Celestron NexStar 8i SE
- 60mm Meade EQ refractor

These telescopes are available for club members to borrow and use for a month or two at a time. Contact John Endreson at [Telescope\\_Loan@astra-nj.org](mailto:Telescope_Loan@astra-nj.org) to borrow a telescope.

**ASTRA-WEAR – Embroidered and/or Printed items with the ASTRA Logo**

You can see some samples at ASTRA meetings. To order by mail: Shelter Cove Embroidery Co. 1333 Bay Ave Toms River, NJ 08753 call 732-506-7700 or E-mail [astra-wear@estitches.com](mailto:astra-wear@estitches.com). Order form is on the ASTRA website.

**ASTRA LIBRARY OF BOOKS AND DVDS:** Many books and DVDs are available for loan from the ASTRA Library for a one month period. A list of these items is available on the ASTRA website. Request for these items must be made prior to our regular meeting and returned by the following meeting. Please e-mail your request for these items to our Librarian Barbara Novick at [Library-Loan@astra-nj.org](mailto:Library-Loan@astra-nj.org) or call her at 732-840-3111.

**ASTRONOMICAL ITEMS FOR SALE, OR HELP WANTED ADVERTISEMENTS:** If you have an item to sell, or need help with an astronomical problem (a question, or telescope setup) contact the

President [President@astra-nj.org](mailto:President@astra-nj.org) to announce it at a meeting and send the advertisement to the newsletter (See Newsletter below).

**ASTRONOMICAL LEAGUE MEMBER SOCIETY**

Astronomical League National Headquarters, 9201 Ward Parkway; Suite 100, Kansas City, MO 64114, 1-816-333-7759 or [www.astroleague.org](http://www.astroleague.org)

The REFLECTOR is published in March, June, September and December. If you do not receive your copy of the REFLECTOR magazine, contact Astronomical League Coordinator (Alcor) Ro Spedalieri ([Treasurer@astra-nj.org](mailto:Treasurer@astra-nj.org))

**EXECUTIVE BOARD**

- President – Rich Brady [President@astra-nj.org](mailto:President@astra-nj.org)
- Vice President-Secretary – Sarah Waters, [VP@astra-nj.org](mailto:VP@astra-nj.org)
- Treasurer – Ro Spedalieri [Treasurere@astra-nj.org](mailto:Treasurere@astra-nj.org)
- Newsletter Editor – Rich Brady [Newsletter@astra-nj.org](mailto:Newsletter@astra-nj.org)
- Webmaster – Donald Durett [Webmaster@astra-nj.org](mailto:Webmaster@astra-nj.org)

**NEWSLETTER:** E-mail material (meeting reports, observing reports, or other items of interest) to [Newsletter@astra-nj.org](mailto:Newsletter@astra-nj.org).

Check us out on Facebook, search groups for (ASTRA Astronomy) and look for our logo.



# ASTRA

## REMAINING SCHEDULE FOR 2014

Jake's Branch and other star parties not included  
(Comments and Suggestions are Welcome)

- May 3*      *Saturday – Astronomy Day – Exhibits and Public Star Party at Jake's Branch Park*
- May 9\**      *Astronomy on-line – Ryan Knipple*
- May 10*      *Saturday – Astronomy Day – Exhibits and Public Star Party at OCC*
- Jun 7*      *Saturday – Summer Star Watch – Public star party at OCC. (Moon 2 days after 1<sup>st</sup> Qtr)*
- Jun 13\**      *Mars – Megan Vicidomini (Start at 7:30)*
- Jul 11\**      *Open*
- Aug 8*      *No Meeting*
- Aug 9*      *Saturday – Perseid Picnic*
- Sep 6*      *Saturday – Fall Star Watch – Public star party at OCC. (Moon 4 days after 1<sup>st</sup> Qtr)*
- Sep 12\**      *Chemistry in the Universe – Matthew McCue*
- Oct 10\**      *Planetarium Show*
- Nov 14\**      *Solar Update – Bill Edelen*
- Nov 29*      *Saturday – Winter Star Watch – Public star party at OCC. (Moon 1<sup>st</sup> Qtr)*
- Dec 12\**      *Awards, Open Meeting, Elections*

\* Regular Meeting