



# the EYEPIECE



the FORT WAYNE ASTRONOMICAL SOCIETY • PO Box 11093 • Fort Wayne, IN 46855

Volume: 57

Issue : 9

September 2016

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FWAS Web page: <http://fortwayneastronomicalsociety.com>

## GENERAL MEETING

Visitors Welcome

Tuesday Evening, September 20, 7:30 PM

TECUNSEH Public Library, 1411 East State Blvd  
Fort Wayne, IN 46805

## Narrow Band Imaging

by Dave Thackeray

Join us as FWAS member Dave uses a  
Keynote presentation to describe his as-  
trophotography activity.

General Meetings are held the third Tuesday of each month,  
7:30pm. Check our web site for location.

## Astrophotography Imaging

Dave Thackary has been a member of our FWAS MOO Group of astrophotographers for a number of years. For our program this month Dave will present a program on Narrow Band Imaging, the advantages, disadvantages, the acquiring of the image and the processing using the Hubble Pallett.

Dave tells us:

Hi, I'm David Thackeray. I am a retired Quality Control Technician. Most of my life my hobby and at times occupation was a piano/keyboard player. My music has been severely limited the last six years after getting hooked on Astronomy and especially Astrophotography. I started in 2010 with a CPC 800 and a DSLR. It has since grown to a SV105T, SV80 St-2.5 optical tubes, on a Losmandy G11, Gemini II mount, and an Atik 383L Monochrome camera with LRGB and Narrowband filters. My main interest is Deep Sky imaging.

I make no claims to be an expert at this, I'm learning as all of us are.

Here is a link to my Pbase Astronomy site.

<http://www.pbase.com/davidthack889>

After the meeting you are invited to join the group that meets for continuing discussions at a restaurant to be selected at the meeting.

## Calendar Events Aug-Sep

Scheduled events for the next two months: Free public observing at Jefferson Township Park every clear Saturday for 2 hours, starting 1 hour after sunset, April - November.

### September

General Meeting Tuesday, Sep 20

Board Meeting Tuesday, Sep 27

### October

General Meeting Tuesday, Oct 18

Board Meeting Tuesday, Oct 25

## Deep Sky Star Parties

Deep Sky observing events are scheduled for FWAS members and their guests to observe the fainter objects in the sky from a location away from city lights. These events are closed to the general public to allow members to plan observing and photography projects that will be undisturbed.

This year we have not yet selected a site. Until we do you are invited to come to JTP for observing. If you have suggestions for a site contact Bob Crider at 747-0774.

Observing times are scheduled for Fridays near the new moon each month. This year the remaining dates are:  
**Sep 30, Oct 28, Nov 25.**

## Public Star Parties

The public observing season started in April. We will need trained volunteers to run the Richard Johnston (RJ) Telescope. **If you wish to participate, with the RJ scope, with your own telescope or without a scope, contact Bob Crider at 747-0774. to get on his volunteer list.** This is a great way to contribute to our community service.

Current events are:

**Fri Sep 23 at Evergreen Park, Huntington, check with Bob Crider for details.**

**Tues Oct 4, Foster Park Golf Clubhouse, 7:30 p.m.** Fort Wayne Trails night bike ride & star party, 70 People.

**Sat Oct 15 Bluffton Halloween Hayride, Check with Larry Clifford, 824-2655, for details.**

## Board Meeting Highlights

- The Board met on 23 Aug in Phil Hudson's office.
- Treas reported current holdings of \$3,307 for General operations and \$47,622 for S\*Q.
- Construction of the S\*Q Observatory is nearly complete.
- The next board meeting will be on Tuesday, 27 Sept., at 7:30 p.m. in Phil Hudson's office.

### FWAS OFFICERS

President: Larry Clifford 824-2655  
Vice-President: Phil Hudson 484-7000  
Secretary: Gene Stringer 489-8135  
Treasurer: Dave Wilkins 444-3070

#### APPOINTED POSITIONS

Observatory Director: Mark Anderson  
260-387-7913  
Star\*Quest Project Manager: Gene  
Stringer 489-8135  
Star\*Quest Treasurer: Dave Wilkins  
444-3070

### EDITORIAL STAFF

Eyepiece editor, Gene  
Stringer, 489-8135  
Distribution, Gene Stringer  
489-8135 & Phil Hudson  
484-7000

Submissions to the Eyepiece  
are cheerfully accepted by  
E-mail (preferred) or on CD  
or other media, or on paper.  
Submissions may be edited

## Star\*Quest Update

By Gene Stringer

IT IS HAPPENING. Robert Koors is reporting that he is approaching his final work on the observatory building. The interior walls have been installed and painted. THANKS to the Construction Team volunteers ( Phil Hudson, Dave Atkinson, Larry Clifford, Gene & Ida Mary Stringer) for the paint job. Greg Jacobs loaned us his spray painter, which helped immensely. Phil sprayed the entire ceiling (and himself) of the roll-off roofs. The rest of us used rollers & brushes on the walls & doors.

The winches have been installed and tested, and do a fine job of moving the roll-off roofs. The electricians are presently on site laying the power cable, finishing wire runs, installing lamps in the control room and installing outdoor power outlets for the external scope pads on a pylon south of the observatory. Our apologies are offered to the members and the public for the two Saturdays that we had to close the site for viewing because of open trenches. We expect to resume public viewing on the field for the remaining two Saturdays this month.

There is still plenty to do to prepare the observatory for public use. I will be scheduling a meeting of the Construction Support Team shortly to schedule the continuing tasks (see the July issue of the Eyepiece).

Downloaded from [science.nasa.gov](http://science.nasa.gov)

## To Benu and Back

**Sept. 8, 2016:** NASA is launching a spacecraft to visit an asteroid... and return to tell the tale.

**OSIRIS-REx** is scheduled to blast off from Cape Canaveral on September 8, 2016, on a mission to orbit, map and collect samples from the asteroid Benu, and return to Earth 7 years later.

<http://science.nasa.gov/science-news/science-at-nasa/2016/benu-and-back/>

Discovered in 1999 by the NASA-funded LINEAR asteroid survey, Benu measures about 1650 feet across and weighs over 60 million tons. Imagine a boulder the height of the Empire State Building—that's about the size of Benu. So, why Benu? Because the asteroid is interesting due to its size and composition, and it is accessible to be sampled.

Benu is a primitive and carbon-rich asteroid. Primitive asteroids contain material that has not changed significantly since they formed over 4.5 billion years ago. The analysis of any organic material found on Benu will give scientists an inventory of the materials present at the beginning of the solar system that may have had a role in the origin of life on earth, and potentially elsewhere. Indeed, Dante Lauretta of the University of Arizona, Principal Investigator on the OSIRIS-REx mission says mapping and sampling the space rock "can potentially hold answers to the most fundamental questions human beings ask, like 'Where do we come from?'"

To get to Benu, OSIRIS-REx will perform a series of deep space maneuvers, first orbiting the sun for a year and then using Earth's gravity to be slung towards Benu.

The spacecraft will spend a year flying in close proximity to Benu – its five instruments imaging the asteroid, documenting its lumpy shape, and surveying its chemical and physical properties.

In July 2020, OSIRIS-REx will approach Benu and execute its touch-and-go – or TAG – maneuver. A mechanical arm that functions like a combination sample scoop and pogo stick will be extended from the spacecraft. The spacecraft will slowly approach the asteroid until the sample head at the end of the arm gives a gentle "high five" to the surface. The maneuver may be executed up to three times, and OSIRIS-REx could leave Benu with up to 4.4 pounds of sample material from the asteroid.

Researchers will be keen to learn about Benu for another reason, too. Benu orbits the sun between Venus and Mars so it crosses Earth's orbit frequently and comes close to Earth every six years. In 2135, Benu will make an especially close approach to Earth, just within the Moon's orbit. This will change Benu's orbit, and it is more difficult to predict how much closer it may come to the Earth after that close encounter. Lauretta says, "We need to learn as much as about Benu as we can."

Predicting a small asteroid like Benu's exact course is somewhat tricky, due to the Yarkovsky effect. The dark asteroid absorbs sunlight and then gives it off as heat, which serves as a gentle thruster that gradually shifts its path. Edward Beshore of the University of Arizona, Deputy Principal Investigator for OSIRIS-REx says, "We'll get accurate measurements of the Yarkovsky effect on Benu by precisely tracking OSIRIS-REx as it orbits the asteroid...." *For updates on the mission to Benu and back, go to [www.asteroidmission.org](http://www.asteroidmission.org)*

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## Is there a super-Earth in the Solar System out beyond Neptune?

By Ethan Siegel

When the advent of large telescopes brought us the discoveries of Uranus and then Neptune, they also brought the great hope of a Solar System even richer in terms of large, massive worlds. While the asteroid belt and the Kuiper belt were each found to possess a large number of substantial icy-and-rocky worlds, none of them approached even Earth in size or mass, much less the true giant worlds. Meanwhile, all-sky infrared surveys, sensitive to red dwarfs, brown dwarfs and Jupiter-mass gas giants, were unable to detect anything new that was closer than Proxima Centauri. At the same time, Kepler taught us that super-Earths, planets between Earth and Neptune in size, were the galaxy's most common, despite our Solar System having none.

The discovery of Sedna in 2003 turned out to be even more groundbreaking than astronomers realized. Although many Trans-Neptunian Objects (TNOs) were discovered beginning in the 1990s, Sedna had properties all the others didn't. With an extremely eccentric orbit and an aphelion taking it farther from the Sun than any other world known at the time, it represented our first glimpse of the hypothetical Oort cloud: a spherical distribution of bodies ranging from hundreds to tens of thousands of A.U. from the Sun. Since the discovery of Sedna, five other long-period, very eccentric TNOs were found prior to 2016 as well. While you'd expect their orbital parameters to be randomly distributed if they occurred by chance, their orbital orientations with

respect to the Sun are clustered extremely narrowly: with less than a 1-in-10,000 chance of such an effect appearing randomly.

Whenever we see a new phenomenon with a surprisingly non-random appearance, our scientific intuition calls out for a physical explanation. Astronomers Konstantin Batygin and Mike Brown provided a compelling possibility earlier this year: perhaps a massive perturbing body very distant from the Sun provided the gravitational "kick" to hurl these objects towards the Sun. A single addition to the Solar System would explain the orbits of all of these long-period TNOs, a planet about 10 times the mass of Earth approximately 200 A.U. from the Sun, referred to as Planet Nine. More Sedna-like TNOs with similarly aligned orbits are predicted, and since January of 2016, another was found, with its orbit aligning perfectly with these predictions.

Ten meter class telescopes like Keck and Subaru, plus NASA's NEOWISE mission, are currently searching for this hypothetical, massive world. If it exists, it invites the question of its origin: did it form along with our Solar System, or was it captured from another star's vicinity much more recently? Regardless, if Batygin and Brown are right and this object is real, our Solar System may contain a super-Earth after all.



*A possible super-Earth/mini-Neptune world hundreds of times more distant than Earth is from the Sun. Image credit: R. Hurt / Caltech (IPAC)*



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**Next General Meeting:**  
**Tuesday, September 20, 7:30 pm**

**TECUMSEH LIBRARY**  
**1411 East State Blvd, 46805**

*\*Program.\**

# Narrow Band Imaging

by Dave Thackeray

**NO STARGAZING  
 TONIGHT  
 due to construction**

Saturday  
 at Jeff  
 every  
 starting 1 hour after  
 continuing for 2 hours.  
 April through November

**September Night Sky:** Neptune, at opposition will be brighter than any other time of the year. This is best time to view and photograph Neptune. Due to its extreme distance from Earth, it will only appear as a tiny blue dot in all but the most powerful telescopes. September 22 - Autumnal Equinox, Fall begins, (balance your egg) Sun rises/sets due East/West. Sept. 28th Mercury at greatest western elongation, look in the eastern sky just before sunrise. New Moon; the 1st, Annular Solar Eclipse not visible in US. Full Harvest Moon; 16th, Lunar Eclipse not visible in US.