

# SPECTRUM

Northern Cross Science Foundation Newsletter

December, 2017

## Looking Up

December 7, Thursday

### General Meeting

7:30 p.m.

Business Meeting

Annual Holiday Party

### Holiday Potluck Party!

(Bring a dish)



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**White Elephant  
Gift Exchange!**

(See Pg 3)

December 21, Thursday

### Board Meeting

7:30 p.m.

House of Jeff Setzer

January 4, Thursday

### General Meeting

7:00 p.m. - Astronomy 101

7:30 p.m. - Main Program

Business Meeting to Follow

January 20, Saturday

### Candlelight Ski & Hike

6:00 p.m. - 9:00 p.m.

Horicon Marsh

February 3, Saturday

### Candlelight Ski & Hike

5:30 p.m. - 8:30 p.m.

Ice Age Center (Dundee)

February 10, Saturday

### Candlelight Ski & Hike

6:00 p.m. - 9:00 p.m.

Pike Lake Beach Area

## Attaching a Cooling Fan to a Newtonian Telescope *By Michael Viasov*

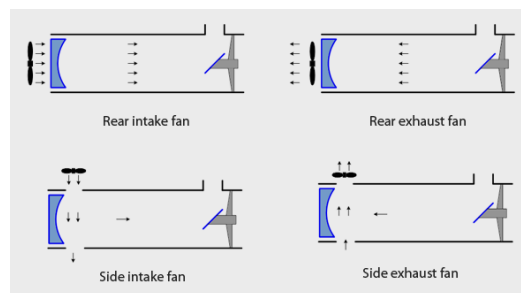
### The Thermal Problem

Cooling a reflector telescope is extremely important, especially if its fairly large (over 8"). As long as the primary mirror is warmer than the ambient temperature (and it usually is) several processes occur: Warm air rises from the mirror causing so called "tube currents", and a boundary layer of warm air forms near the surface of the primary mirror. The resulting turbulence degrades the wavefront, making the image "dance", and blurs its fine details. Also the mirror itself might change its properties if different parts of the mirror have different temperatures (a common cause for a spherical aberration).

Even if you take the telescope outside 1-2 hours before the observing session begins, a mirror will still be warmer than the ambient. That is because it takes longer for the glass mirror to cool down, than for air temperature to drop as the night progresses. This effect is especially severe in case of cold weather during winter and/or large mirrors.

### Active Cooling Options

The solution is active cooling of the primary mirror. There are several ways of doing the job, while most popular of them involve attaching some type of PC fan to back of the OTA (which is often fitted with screw holes for this purpose). There are many variations: An intake or an exhaust fan, one big or several small ones. Additional option is to attach side fans, right over the mirror's surface. Each way have its advantages and disadvantages:



*Reflector telescope active cooling methods and different fan placements*

A large rear mounted intake fan, which blows the air on the mirror's surface, is the most effective for actually cooling the mirror. It might be a good idea to mount it on some sort of circular mask (preferably with a mesh dust filter), which will force the air into the OTA.

Exhaust rear fan is often used instead of an intake one because it doesn't suck up dust into the tele-

scope from behind (which is closer to the ground), and arguably creates more laminar airflow inside the OTA, since the air enters the telescope from a clear aperture and not pushed by fan's blades from behind a mirror. Another reason for avoiding the intake method is that every fan slightly heats up the air flowing through it, especially if there is a dust filter.

Side mounted fans are used for blowing the hot turbulent boundary layer off the surface of the mirror. Usually these are small intake fans (with dust filters), probably to better direct the air stream and increase the "blow off" effect, and they are turned on during the whole observing session. Some experienced amateur astronomers claim that this is a must have modification for a serious planetary telescope. A clear disadvantage to this method is having to drill holes in the OTA. Note that for side blowing fans - smaller holes should be drilled on the opposite side, arranged in a line above the mirror edge, with the overall area comparable to the area of the fans.

A combination of rear and side fans can be used both for effective cool-down and for controlling the boundary layer.

There are more "exotic" methods - like suspending a small fan in front of the mirror, attaching a metal cooler or a peltier devices on the mirror's back end, or using a rear intake fan with a diaphragm around the main mirror (which forces the air to blow on mirror's surface).

While choosing the fan which is turned on during the observing - important consideration is the fan size and quality: A quality "silent PC" type of fan from a known manufacturer (with ball or oil bearings) usually will do the job.

A large fan is capable of producing the same airflow as a small one, while working at lower RPM speed - Therefore theoretically it should produce less vibration. However in practice it not always true, since with one of my fans I found out that lower frequency vibrations of a large fan (a quality and expensive Noctua model) actually affect my telescope more than higher frequency vibrations of a smaller fan. Also not every "quiet" fan is necessarily vibration free. Therefore it's best to experiment with different models. In any case it's a good idea to have an option to limit the RPM speed by supplying a lower voltage (or adding a series resistor). Some "quiet" fans come built-in with such option.

(Con't Pg 4)

## November Meeting Minutes

By Kevin Bert

The November Business meeting of the Northern Cross Science Foundation was held at the GSC Technology Center in Germantown. President Jeff Setzer called the meeting to order at 8:05pm and welcomed 12 members and guests. On a positive note he had seen a strong social media response to the club over the last year. It was unfortunate that the last set of public events suffered from poor weather. One of the first orders of business was to ask for nominations to the board. Jeff explained that there was no need to because none of the board members three year terms will expire at the end of the year. He then asked for standard reports.

There was no treasurer report. Secretary Kevin Bert noted the newest member Shariff Attaya from Milwaukee. Under Astronomical League news the 2018 Regional Convention will be held in Sturgeon bay on May 4th and 5th. The League's National Convention, (ALCON), will be held in the Twin

Cities on July 11 - 14 next year. A promotional on line video from the hosting Minnesota Astronomical Society was shown. The hope is that many members would take advantage of these great events and attend.

Jeff Setzer informed the membership that the holiday party would once again be held at the December meeting. Information was missed in the last newsletter so it was agreed to send out the details in the Spectrum one week earlier for members to get the word and have time to prepare a dish or to come up with a white elephant gift.

Under new business Jeff said that the club's social media Slack account would be dropped in favor of a more popular face book private platform. Details to come.

Early next year a committee for planning the 2020 Astronomical League Regional Convention will meet. The Northern Cross volunteered to host that convention and past experience tells us that an early start is a key to having a successful event. Look for more information on this starting date.

With no further business Jeff closed the meeting at 8:25 pm.

## 2018 Dues

Your 2018 Dues invoice is included with this Newsletter. New members having joined the Club this past year will find their dues have been pro-rated, making them payable on the same schedule as the rest of our general membership (at the beginning of each calendar year). Members receiving electronic mailing can download the Dues Invoice from the Club website or print the attached pdf file. Additional copies of the Invoice will be available at the December Membership Meeting.

Instructions for submitting Dues are indicated on the Invoice.

**Note:** Sky & Telescope Magazine and Astronomy Magazine are available at a discount with your Club membership. See the 2018 Dues Invoice for information on how to take advantage.

## Imaging Report *Ernie Mastroianni*



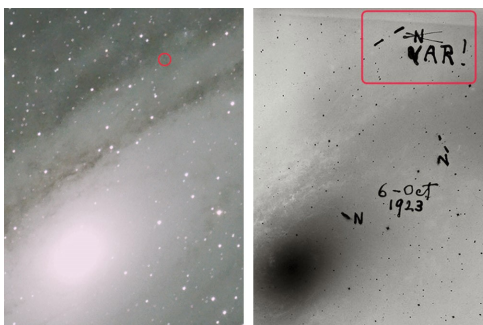
Andromeda Galaxy. Photo by Rick Kazmierski

Although the Andromeda Galaxy is a familiar target for astrophotographers, this particular version, taken by Spectrum editor Rick Kazmierski from his backyard observatory, brings out faint outer nebulosity and shows sharply focused stars across the entire frame. With Kazmierski's gentle hand at processing with PixInsight, the image is suggestive of the classic image made by Edwin Hubble in 1923 with the 100-inch Hooker telescope atop California's Mount Wilson.

Back then, M31 was known as the Great Spiral Nebula. Astronomers did not yet have proof that it was a separate galaxy. But Hubble spotted a Cepheid variable star within the galaxy, and marked it on this glass plate. Cepheids display an intrinsic luminosity and a telltale curve directly related to the time between maximum and minimum brightness, thus providing a value for its absolute magnitude. Because the photograph shows its apparent magnitude, its distance could be determined, providing the

first proof that M31 was a separate galaxy and not a spiral nebula.

But Kazmierski recorded his photo with a CDS-600D digital camera by Central IDS, not a large glass plate, and his Stellarvue triplet refractor has an aperture of just 2.75 inches. Amazingly, an enlargement of Rick's image cropped to the same field of view as Hubble's image reveals that same historic Cepheid variable, glowing just on the edge of visibility somewhere between 18th and 19th magnitude!



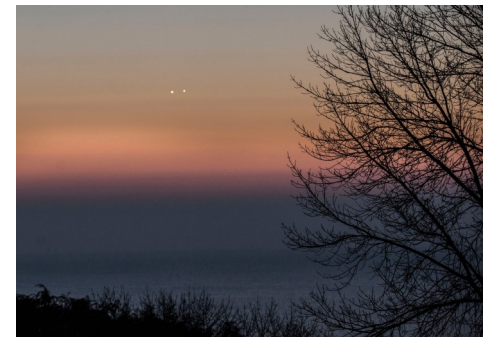
Cepheid variable discovered by Hubble, right image. Rick's image on left.

And in a more recent event much closer to home, just 18 arc minutes separated Jupiter and Venus as they rose in conjunction on the morning of November 13. Twilight was well advanced, and the two planets, though easily visible in the red glow of pre dawn, were quite close to the horizon. My vantage point on a bluff in Whitefish Bay overlooking Lake

### Imaging best viewed in digital form of the Newsletter.

Michigan was ideal. But my previous attempts at photographing such conjunctions were less than impressive. The bright pinpoints of light seem less bright in a photograph.

But this image is not quite focused on infinity (the foreground tree is sharp), so it rendered the planets as slightly larger discs, giving an impression much closer to what the eye perceives. I uploaded the picture on Twitter and it quickly took off, getting more than 65,000 views, 550 likes and 266 retweets as of this writing. It is a 1-second exposure with a Nikon D700 at ISO 400 with a 70-200mm lens set at 125mm. One of my Facebook friends described it as "headlights in the sky".



Jupiter/Venus Conjunction November 13.th.  
Photo by Ernie Mastroianni

<http://blogs.discovermagazine.com/outthere/2017/01/02/the-day-we-discovered-the-universe/#.WhmiU0trx0d>  
<http://blogs.discovermagazine.com/outthere/files/2017/01/M31.jpg>  
<https://obs.carnegiescience.edu/PAST/m31var>

## December General Meeting

### NCSF Holiday Party

Please bring a dish, desert, appetizers to pass.

Beverages will be provided!

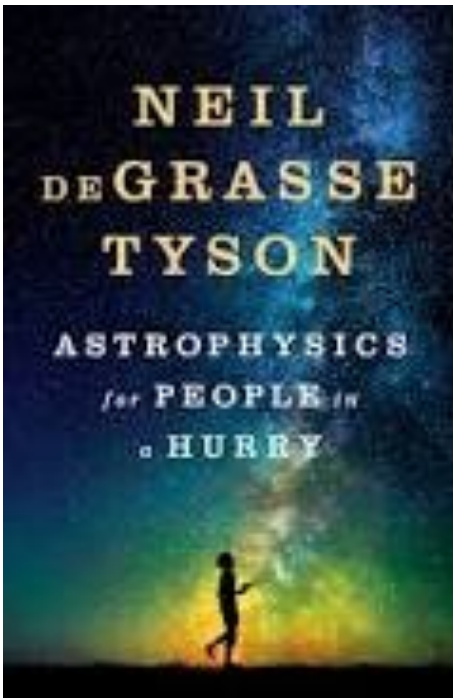


### Annual Board Nominations

At the December General Meeting each year NCSF completes nominations and has elections for open Board positions and elects new Board Members.

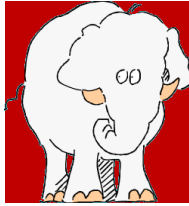
This year there are no open Board positions to fill as current Board Members are still serving all or part of their three year term.

### Neil Degrasse Tyson's New Book



What is the nature of space and time? How do we fit within the universe? How does the universe fit within us? There's no better guide through these mind-expanding questions than acclaimed astrophysicist and best-selling author Neil deGrasse Tyson.

But today, few of us have time to contemplate the cosmos. So Tyson brings the universe down to Earth succinctly and clearly, with sparkling wit, in tasty chapters consumable



### White Elephant Exchange

Entertainment at it's very best!  
Will this be your year to join in?  
The more the merrier!

A White Elephant gift is something lurking around in your astronomy closet gathering dust or the book shelves loaded with books. Do you have drawers loaded with charts and maps?

Or... perhaps, in your travels, you see something funny or yummy, the imagination soars! This is for entertainment and not gain, so we all have a great time

1. Bring an \*astronomy-themed, wrapped gift!
2. When the gifts arrive we will have numbers attached to them with matching numbers in a hat.
3. One by one, each participant will draw their prize number and open it to the oohs and ahhs of all present.

anytime and anywhere in your busy day.

While you wait for your morning coffee to brew, for the bus, the train, or a plane to arrive, *Astrophysics for People in a Hurry* will reveal just what you need to be fluent and ready for the next cosmic headlines: from the Big Bang to black holes, from quarks to quantum mechanics, and from the search for planets to the search for life in the universe.

### P.S. from page 4

**Note:** Nowadays it's very cheap to buy an electronic thermometer with an external sensor which is supposed to show "inside" and "outside" temperature. I've attached such device to my telescope, with its "outside" sensor fixed to the back surface of the mirror (you can see it in a previous picture). This way I can easily know when my telescope is ready for the observing session.



## RELATED INFO

### Leaders for Public Viewing

#### January 20

Horicon Marsh  
DuPrees

#### February 3

Ice Age Center  
DuPrees

#### February 10

Pike Lake  
Charlotte and Gene DuPree

## Star Parties 2018

### **NCRAL 2018**

**May 4 - 5**

Surgeon Bay, Wi

Door Peninsula Astronomical Soc.

[www.doorastronomy.org](http://www.doorastronomy.org)

### **ALCON 2018**

**July 11 - 14**

Minneapolis/St. Paul, Minnesota

Minnesota Astronomical Society

[alcon2018.astroleague.org](http://alcon2018.astroleague.org)

### **WOW**

**July 12 - 15**

Hartman Creek State Park

[WWW.new-star.org](http://WWW.new-star.org)

### **Northwoods**

**August 17 - 19**

Hobbs Observatory

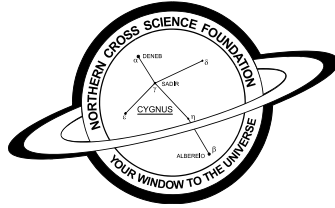
Beaver Creek Reserve

Fall Creek, WI.

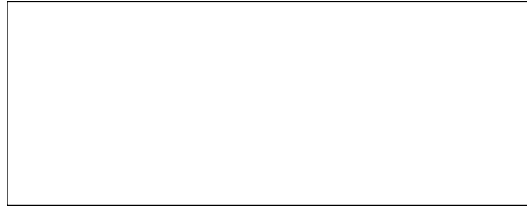
[www.cvastro.org](http://www.cvastro.org)



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Jim & Gwen Plunkett  
OBSERVATORY



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## Attaching the Fan - a Simple Example



Fan attached to an 8" Telescope

possible - using a thick double sided "Scotch" adhesive tape. It is the same tape I use to attach my secondary mirror.

In my 10" Newtonian in order to avoid routing the power to the telescope from an external battery - I've attached, using a velcro tape, a power source to the telescope's body as well. It is a small Li-ion battery which powers the cooling fan and a dew controller box.

Probably a better (and a more complex) way would be to use some sort of dampening rubber to fight the vibrations. However in my case I found out that at low speed settings the vibrations are negligible, and I couldn't notice any effect from them even during planetary astrophotography. At maximum speed on a 8" telescope - the vibrations did blur the stars into long streaks, but I only use this speed for the initial cool-down.

It is curious that an attempt to mount the fan using an external "cap" to the telescope's body, which was supposed to improve the airflow efficiency, actually caused really bad vibrations to my 10" scope, as opposed to attaching the fan directly to the mirror cell. Maybe this introduced some sort of resonance specific for my setup and the fan speed, or maybe the mirror cell's springs act as a dampener. Note that in my latest 12" Orion UK Newtonian the factory mounted small fan is also integrated into the mirror cell, and it's not causing noticeable vibrations.

(See "P.S." page 3)

<http://www.deepskywatch.com/Articles/rear-fan->

For my 8" Orion Newtonian (and later for the 10" Sky-watcher as well) I've simply attached a large rear fan directly to the mirror cell. I've used an Antec 3 speed 120mm fan, which have proven to be vibration free and has a very handy three speed option. I did the attachment the simplest way

possible - using a thick double sided "Scotch" adhesive tape. It is the same tape I use to attach my secondary mirror.



Cooling fan, a dew controller, a Li-ion battery and mirror/ambient thermometer mounted on a 10" Newtonian Telescope.

## SPECTRUM

Published by the Northern Cross Science Foundation, Inc. A non-profit organization based in South-eastern Wisconsin.

NCSF is a member of the North-Central Region of the Astronomical League.



NCSF supports the **International Dark Sky Association**



This Issue, along with back Issues of SPECTRUM, can be found on the NCSF Web Site.

## Monthly Meeting Information

7:00 p.m. Astronomy 101 Mtg.  
7:30 p.m. Main Program  
Location at the -

GSC Technology Center  
W189 N11161 Kleinmann Dr  
Germantown, WI 53022

Spectrum Newsletter  
5327 Cascade Drive  
West Bend, WI 53095

Please send your Questions, Suggestions, Articles, and photos to:  
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