



PAStimes

Phoenix Astronomical Society

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PHOENIX ASTRONOMICAL SOCIETY — ESTABLISHED 1948

Danny Jacobs to Speak at April 1st Meeting

“Cubesats as mini space telescopes and beyond”

Space is everyday becoming more accessible. The cubesat form factor makes it possible for anyone to build a satellite and get it into space. At ASU, students are building them as club projects and research groups are using them for high risk/high reward science. Recent developments have made it possible for a university to build custom space telescopes or send instruments to the moon.

Danny will describe the basics of building a cubesat and getting it to space and tell you about recent projects including ASU's first cubesat, Phoenix, which was recently deployed, LunahMap which will look for water on the moon, and SPARCS which will monitor m-dwarf flares in the UV. Cubesat activities at ASU are support-

ed by the Interplanetary Initiative Laboratory, a "space maker-space" which opened last year and continues to add new capabilities.

Danny Jacobs is a physicist with a wide range of interdisciplinary projects in the areas of low frequency radio cosmology, cubesats, and a long tail of seemingly unrelated projects. As a professor at ASU he teaches Astronomy, electronics, and systems design in the School for Earth and Space Exploration and is an Associate Director of the Interplanetary Initiative where he leads the laboratory unit. Notable projects include the Hydrogen Epoch of Reionization Array where he is Project Scientist, the SPARCS cubesat serving as spacecraft lead, the ECHO radio drone calibrator (PI) and the Deployable Optical Receiver Array (DORA, also PI). HERA is a pre-cursor to
See April 1st Meeting on page 2.

the proposed lunar Cosmic Dawn Mapper, the Square Kilometer Array, and several proposed orbiters.



Danny Jacobs will be presenting on April 1st "Cubesats as mini space telescopes and beyond." Please bring a friend to this meeting. Photo provided by Danny.

No April Fool's Jokes this Year

Don K. Boyd PASTimes Editor
We considered doing some kind of prank for April fool's day for this issue of our newsletter as this month's meeting falls on April 1st, and we considered this to be our publication date. We have done things in

the past such as print the whole newsletter upside-down. But when we thought about it, we realized nothing we may do as a prank in this issue of the newsletter, would even come close to what mother nature has pulled on us over this last year with the

pandemic. So no pranks were done for the April 2021 issue of our club newsletter. Maybe for 2027, which is the next year that April 1st falls on a Thursday it will be a better year for pranks to be done.

March 4th PAS Meeting Review

By Terri, Event Manager

Will Oldroyd was a very good guest speaker. He was entertaining, informative, and gave a review of the Solar System objects before diving into the main topic of the evening. We hope to have Will come back and present again as many PAS Members told me they would love to hear more from Will Oldroyd.

The Guest Speaker began at 7:34pm and ended his presentation with Q&A at 8:44pm. There were 27 attendees at this

meeting. I wish to thank everyone who muted their devices and turned off their cameras to give Will our complete attention. It made for a very nice, uninterrupted presentation.

Will writes: Thanks Terri, I really enjoyed presenting to your group. I was impressed by the high level questions everyone was asking. I'd love to have a copy of the presentation, thank you. Have a great day! Will Oldroyd



Will Oldroyd gave a marvelous presentation at the March 4th Virtual PAS Meeting. Photo taken during the meeting by Don Boyd.

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PAS Meeting of the Minds March 12

By Terri, Event Manager

This was a very interesting meeting, and a lot was accomplished. Thirteen PAS members attended the meeting. A collection of eight topics were discussed for the first 1.5 hours. The general idea was discussed as to if it is time for PAS to start doing in-person events and if not now, then

when? The consensus was to wait until September 2021 before PAS commits to doing anything in-person.

After the main meeting, a Virtual Star Party (VSP) meeting was held for a half hour to discuss items that were to be researched before the next VSP which will be on March 18th for PAS Members only.

This was a very enjoyable meeting and a lot of great ideas were shared.

I wish to thank Stu for hosting this meeting and I thank everyone who attended. The ideas that were shared and the conclusions that were drawn were very helpful to the continuation of PAS as a club.

April 1st PAS Meeting - NOT A JOKE

By Terri, Event Manager

Please join us in welcoming Danny Jacobs to the April 1st PAS Meeting. This will be an exciting, informative meeting that you will not want to miss. Meeting doors open at 7pm virtually, and the meet-

ing starts promptly at 7:30pm. Danny will start his presentation shortly after 7:30pm.

Everyone is invited to attend. Please mute your viewing device and turn off your camera through the presentation and Q&A. Q&A will be held through the Zoom Chat

and will be hosted by PAS Meeting Host Stu Brackney. Please Bring a friend to this fantastic presentation! See you there

Virtual Zoom Link for this meeting: <https://us02web.zoom.us/j/86077408863?pwd=bU9xTXhRYW5Za3lPdTkrcbkN4NWtBZz09>

What's Up For April?

By Don K. Boyd, PAStimes Editor

Name	Date	Rise	Set
Mercury	04-15-21	05:54	18:38
Venus	04-15-21	06:18	19:21
Mars	04-15-21	09:18	23:44
Jupiter	04-15-21	03:21	14:12
Saturn	04-15-21	02:39	13:06
Uranus	04-15-21	06:41	20:03
Neptune	04-15-21	04:34	16:03
Pluto	04-15-21	01:50	11:50

All Times Arizona Time

Bold means the object is "visible" in the evening

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April 15, 2021

Sunrise: 05:58

Sunset: 19:00

Q3: April 4

New: April 11

Q1: April 20

Full: April 26



Setting Up PAS Events through Summer 2021

By Terri Finch, Event Manager

At the PAS Meeting of the Minds that was held on Jan 21st 2021, it was decided that PAS would like to hold 2 Guest Speaker Meetings per month, if possible. Here's the link to know what Guest Speakers are planned and on what dates (I update this list as Paul and I set up the Guest Speakers): <https://docs.google.com/document/d/1OO-UpaYNvw3p7JCRXCKSjDcbsK60DnvW0oifbqPrNp8/edit?usp=sharing>

The first General PAS meeting of the month will be the one where we have a Professional Astronomer on the first Thursday of the month, or at least in the first week of the month (when the guest speaker can't do the First Thursday of that Month).

The second meeting of the month would be provided by a PAS member, two weeks later, so on the third Thursday of the month (if there are five Thursdays in that month).

This pattern would continue through this summer and until PAS can safely do in-person meetings again. During the Sum-

mer months, both the first and third Thursdays of the month would be PAS Members since PAS doesn't usually meet during the summer months due to our meeting location not being available during the summer. But, since the meeting location situation is moot due to Covid, and doing these meetings virtually, this summer I hope to schedule two meetings each month during June, July and August with a very interesting Guest Speaker from PAS or other sources.

If you are interested in providing a presentation of any kind, so long as it is astronomy related (that's a very big field with a wide range of topics), then email me by return email or at Starstuff@gmail.com and set this up with me. You don't have to be a PAS Member to do a presentation for one of these PAS Meetings. When you reply, pick the date you wish to do your presentation. Here are the dates we are trying to fill: June 3, June 17, July 1, Aug 19th, as of the Press date of this newsletter.

Why is PAS doing this?

Everything in-person is currently can-

celled due to Covid.

And PAS was trying to set up

- * A General "What telescope to purchase as your first scope" session and

- * A Virtual Star Party by any PAS member or Guest, or several members who have the ability to provide a view through their scope of outer space, and present it via Zoom.

I wish to also set up other types of events, if you are interested in doing this, and maybe make it a monthly event, or trade off between PAS members as to who does it on what nights. Let me give you the best viewing nights for a Zoom Virtual Star Party (VSP) and you can tell me if you have the equipment to do it and if you wish to do it and on what nights. See the review of PAS's first VSP Rehearsal of March 9th, in this newsletter.

Let's get some of these things set up so that we have activities for the public and for our PAS members to enjoy this summer! I await your emails.

PAS MOM's Virtual Star Parties March 3

By Terri, Event Manager

On March 3rd, PAS Members were invited to attend a Meeting of the Minds to talk about the set-up of Virtual Star Parties.

The meeting ran from 7pm to 8pm and there were 9 PAS Members in attendance. It was a successful meeting. A test run of this idea was set up for Tuesday March 9th

through Zoom for those who committed to assisting with this plan. More details will be shared as the plans happen.

The 1st Virtual Star Party Rehearsal March 9

By Terri Finch, Event Manager

Many PAS Members may know that it has been a goal of PAS to attempt a well-planned, rehearsed Virtual Star Party for everyone to enjoy while Covid is still a threat. PAS held its first Virtual Star Party (VSP) Rehearsal on March 9th from 7:30pm to about 10pm.

I wish to thank the Virtual Star Party Team who attended this meeting/rehearsal: William and Terri Finch (Q&A Chat Room), Stu Brackney (VSP Manager), Sam Insana (Object Announcer), Mike Marron (Object Announcer), plus Bruce Wurst and Don Boyd who played the part of Audience and provided some great feedback at the end of the session on how to improve it.

Then the important attendees who ran the telescopes and provided the views of the night sky: Mark Savan, Ted Blank, Mark Johnston and Richard Sauerbrun.

The evening opened with some shared ideas, and then a rehearsal was experienced. I must thank Stu for really managing this event and coming up with great ideas to share on making it better. Also, the telescope team did a fantastic job of putting together a list of what objects were to be shown, by whom, and which Object Announcer would take the position to talk about the object. Some additional help was thought up... Terri and Stu could take turns preparing for each object, showing where it is in the night sky using the Stellarium star chart, and we also had Sam and Mike show

and tell meteorites.

A 2nd VSP rehearsal to which all of PAS ONLY is invited - so that we can have an audience participate and give feedback, will take place Thursday March 18th, starting at 7:30pm. The link to this Zoom meeting will be provided only to PAS Members in the Private PAS online Calendar for March 18th. PAS members are encouraged to attend and give feedback. Please mute your devices and turn off your cameras during the VSP rehearsal and then stick around after we close the VSP session to give your feedback on improving this for the public. At that rehearsal, we will pick the date of the 1st Public VSP. Hope to see all PAS Members attend and help create the best possible VSP experience possible!

Alex Woronow to Speak at April 15 Meeting

“Astro-Image Processing in the Age of Artificial Intelligence—A Whole New Universe Out There!”

Thanks to Artificial Intelligence (AI) technology recently becoming available to the photographing public, the world of image processing has been reinvented. At this point, only StarNet++, a PixInsight tool for removing stars from images, addresses the particular AI needs of astro-imagers. However, general-purpose, readily available AI image-processing tools apply equally to landscape and astro images. They remove image noise and blur, sharpen image detail, remediate sensor defects, and more. AI tools accomplish their tasks more effectively and with fewer residual artifacts than prior technologies. This presentation will review how AI technology operates (it's always wise to understand the tools you use) and illustrate what image-processing problems it solves. Hopefully, this presentation will help you decide if AI is right for your image-processing tasks.

Dr. Alex Woronow: My interest in astronomy addiction dates from the 7th

grade, passed through a mirror-grinding phase in 9th grade, and continued to a Bachelor's degree in astronomy from Cal and a Ph.D. in planetary geology from Harvard. I joined the research faculty at the U-of-A's Planetary Sciences Department in the '70s. I received a couple of decades of research funding for planetary studies from NASA, primarily while teaching in U of Houston's Geosciences Dept. Upon retirement, I toyed with acquiring my own astro-images, but my age and health suggested that lugging a telescope into the cold nights did not a viable hobby make! So, now I subscribe to imaging scopes in Chile and New Mexico and specialize in high-resolution image processing and dabbling in abstract astro-image art, predicated on AI technologies.

I received an B.A. degree in Astronomy from Berkeley, an M.S. in geology from U. Houston, and my Ph.D. from Harvard, where my dissertation focused on the statistics of cratering on Mars. After several years on the research faculty at U. Arizona's Planetary Sciences Department, I



Alex Woronow. Photo provided by Alex.

joined the Geosciences faculty at U. Houston. I have held many NASA research grants and written numerous papers on planetary-surface processes and statistical methods applicable to planetary geology. My final work years were at Exxon's research lab, developing and deploying a novel Bayesian risk-assessment technique for hydrocarbon exploration. My astro-image processing interest focuses on extracting maximum information from the images utilizing artificial intelligence and statistical tools.

Apr 15th PAS Meeting

By Terri Finch, Event Manager

Please join us in welcoming Dr. Alex Woronow to the April 15th PAS meeting during which he will share this fantastic presentation. Pop into the Zoom Meeting at this link:

[https://us02web.zoom.us/j/9299220481?p](https://us02web.zoom.us/j/9299220481?pwd=Mj8rVUJiYlAzbkxBUlFJQm1WN2hoQT09)

[wd=Mj8rVUJiYlAzbkxBUlFJQm1WN2hoQT09](https://us02web.zoom.us/j/9299220481?pwd=Mj8rVUJiYlAzbkxBUlFJQm1WN2hoQT09) around 7pm if you wish to chat with PAS members, and the meeting will begin promptly at 7:30pm. Alex will present on the topic listed above. We ask that everyone mute their devices and turn off the camera

so that Alex can present without interruptions. After Q&A has concluded, you may then turn on your mic and camera. Thanks to everyone who attends this fantastic meeting! This will be a topic you will NOT want to miss. See you there!!!

EAA Star Party at Pinnacle Peak Park March 5th



Mark Johnston's set-up at the EAA Star Party of Mar 5th. Photo provided by Mark.

By Mark Johnston, PAS Member

I did an EAA outreach event for the City of Scottsdale at Pinnacle Peak Park last night. We had about 21 attend. Richard Sauerbrun from PAS attended and pro-

vided assistance. We showed M45, M31, M33, M42, the Horsehead nebula, the Medusa nebula, the Rosette nebula, M81/82, M35 and M51. It was a great evening.

2021 PAS Virtual GUEST SPEAKERS

By Terri Finch, Event Manager

Events@pasaz.org

Due to the Covid-19 pandemic, PAS Meetings are being held via Zoom over the internet. The Zoom link has been added to the calendar listing for that night's meeting and in the Newsletter in the article about the next PAS Meeting. Please visit the PAS calendar at PASaz.org to find out more about these upcoming Virtual Meetings and Guest Speakers. For a complete list of Guest Speakers, visit:

<https://docs.google.com/document/d/1OO-UpaYNvw3p7JCRXCKSjDcbsK60DnvWOoifbqPrNp8/edit?usp=sharing>

Do you have an idea for a guest speaker? Email Paul Facuna VicePresident@pasaz.org the details and contact info for that possible Guest Speaker.

Here are the next scheduled virtual guest speakers at PAS:

Apr 15: Alex Woronow: Artificial Intelligence & Astro Imaging

May 6: Dolores Hill: Osiris-REX Mission

May 20: Mike Marron: AZ Shattering Impact

July 15: Mark Johnston: EAA Set Up

Aug 5: Richard Sauerbrun: Astrophotography

Sept 2: TBA



Taking the Dog Stars for a Springtime Walk: Sirius and Procyon

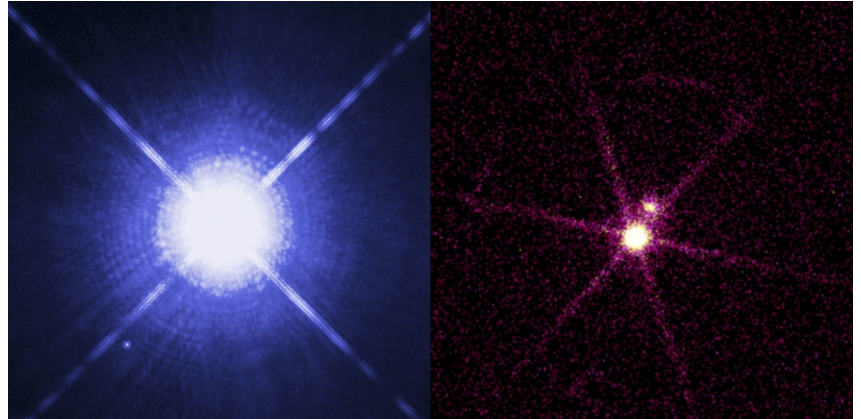
By David Prosper

March skies feature many dazzling stars and constellations, glimmering high in the night, but two of the brightest stars are the focus of our attention this month: Sirius and Procyon, the dog stars!

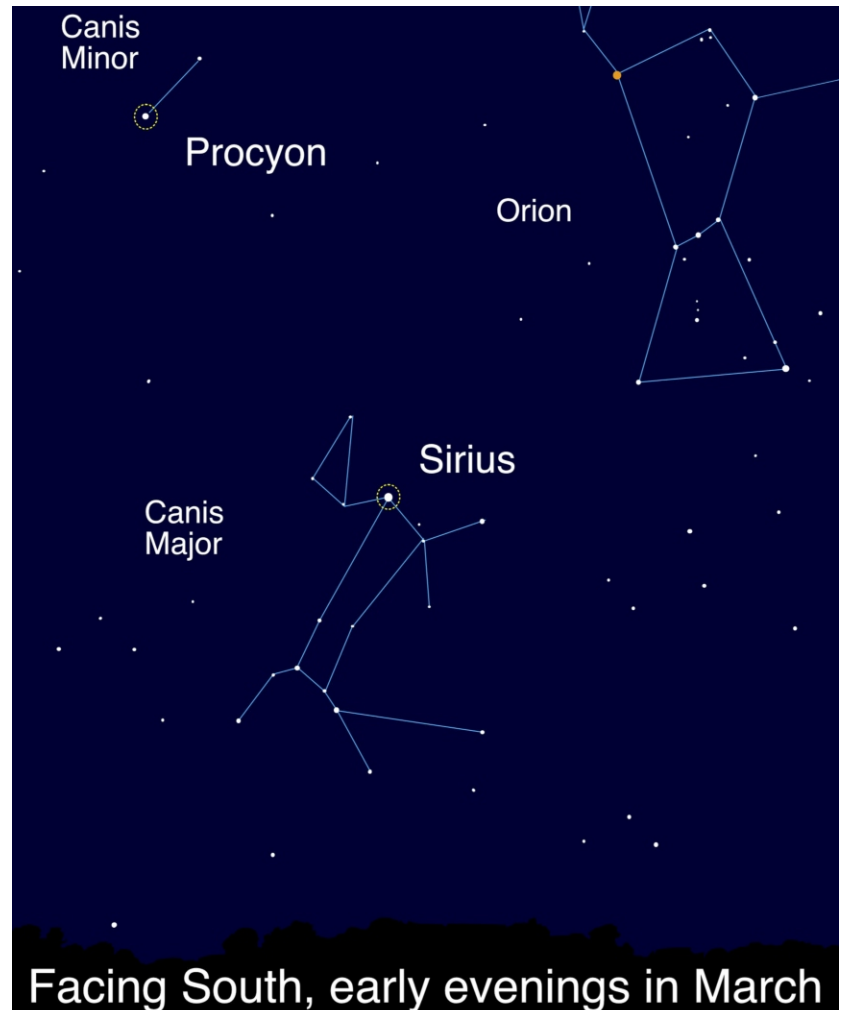
Sirius is the brightest star in the nighttime sky, in large part because it is one of the closest stars to our solar system at 8.6 light years away. Compared to our Sun, Sirius possesses twice the mass and is much younger. Sirius is estimated to be several hundred million years old, just a fraction of the Sun's 4.6 billion years. Near Sirius - around the width of a hand with fingers splayed out, held away at arm's length - you'll find Procyon, the 8th brightest star in the night sky. Procyon is another one of our Sun's closest neighbors, though a little farther away than Sirius, 11.5 light years away. While less massive than Sirius, it is much older and unusually luminous for a star of its type, leading astronomers to suspect that it may "soon" - at some point millions of years from now - swell into a giant star as it nears the end of its stellar life.

Sirius and Procyon are nicknamed the "Dog Stars," an apt name as they are the brightest stars in their respective constellations - Canis Major and Canis Minor - whose names translate to "Big Dog" and "Little Dog." Not everyone sees them as canine companions. As two of the brightest stars in the sky, they feature prominently in the sky stories of cultures around the world. Sirius also captures the imaginations of people today: when rising or setting near the horizon, its brilliance mixes with our atmosphere's turbulence, causing the star's light to shimmer with wildly flickering color. This vivid, eerie sight was an indication to ancient peoples of changes in the seasons, and even triggers UFO reports in the modern era!

Both of these bright stars have unseen companions: tiny, dense white dwarf stars, the remnants of supermassive companion stars. Interestingly, both of these dim companions were inferred from careful studies of their parent stars' movements in the 1800s, before they were ever directly observed! They are a challenging observation, even with a large telescope, since their parent stars are so very bright that their light overwhelms the much dimmer light of their tiny companions. The white dwarf stars, just like their parent stars, have differences: Sirius B is younger, brighter, and more energetic than Procyon B. Careful observations of these nearby systems over hundreds of years have helped advance the fields of: astrometry, the precise measurement of stars; stellar evolution; and asteroseismology, the study of the internal structure of stars via their oscillations. Discover more about our stellar neighborhood at nasa.gov!



Sirius A and B imaged by two different space telescopes, revealing dramatically different views! Hubble's image (left) shows Sirius A shining brightly in visible light, with diminutive Sirius B a tiny dot. However, in Chandra's image (right) tiny Sirius B is dramatically brighter in X-rays! The "Universe in a Different Light" activity highlights more surprising views of some familiar objects: <http://bit.ly/different-light-nsn> NASA, ESA, H. Bond (STScI), and M. Barstow (University of Leicester) (left); NASA/SAO/CXC (right)



Sirius and Procyon, the loyal hunting dogs of nearby Orion the Hunter! What other stories can you imagine for these stars? Learn about "Legends in the Sky" and create your own with this activity: <https://bit.ly/legendsinthesky> Image created with assistance from Stellarium.

A Most Up-And-Down Star Party March 6th

By Sam Insana PAS Secretary

Saturday night, March 6th, a few PAS members showed up at Needle Rock picnic area at the Verde River. Pete Turner arrived with his wife Andie and they were a delight to talk to. Unfortunately Pete forgot a main part of his 12-inch Dobsonian, so he and Andie resigned themselves to stay and just lay back and enjoy the fine weather and dark skies.

Mark Johnston had purchased a very expensive astronomy camera that he wanted to try out. Unfortunately, there was a problem with it, so Mark spent a frustrating night obtaining either very light or very dark images.

Ted Blank showed up with a group of tourists that wanted to see the night sky. He delighted them with his telescope and they complied with the mask safety procedures. The next day Ted was to be married to his fine lady Peggy Yeargain.

I had my 8-inch Newtonian reflector and wanted to try to image M51 the Whirlpool galaxy and M104 the Sombrero galaxy and M13 globular cluster. Unfortunately the sky was bright to the south where M104 was located. It turned out M13 wasn't going to be in a good position until about 2 am. That left me with M51. There were air-

planes with bright lights flying right by the target all night. I managed to take ten 30-second images and stacked them to produce the attached photo. Very mediocre, but actually looks like an image one would see in my son Frank's 16-inch Dobsonian with very dark skies.

I managed to shoot M1, the Crab Nebula, with many 30-second images and stacked 28 of them to again produce a very mediocre image that is shown here in this newsletter and again is similar to what one would see with my son's 16-inch Dobsonian in very dark skies. I took a sky quality reading at 10pm and it was Bortle 4.3

We couldn't see the Milky Way so we had only mediocre skies. Then clouds started rolling in making it mandatory to pack up before midnight. My NOAA satellite image app showed no clouds in the area and Mark agreed clouds were not in the forecast. Very strange?!!

One final horrible note. Andie was walking across a dirt area about 8pm and I told her to watch out because there was a steep cement curb with a drop off to asphalt. A few seconds later there was a loud scream and

Pete and I rushed to her to help her up. She apparently busted her wrist, so Pete drove her to the Hospital. I photographed the item that caused her accident, a very small bush that no person could have seen without a flashlight. I imagine Andie didn't want to disturb the three nearby telescopes. She is a fine lady, very athletic and in great shape, so we all hope for Andie's speedy recovery.

Pete adds: Nice article Sam. Sorry you and Mark had difficulty imaging. Andie's wrist is badly bruised but no break. She also had a nasty cut where her arm ended up entangled in the wheel well of the car next to the curb.



This is the "Foot Grabbing Bush" that got ahold of Andie's leg. Photo by Sam.



M1, the Crab Nebula, with 26 stacked images. Photo by Sam Insana.

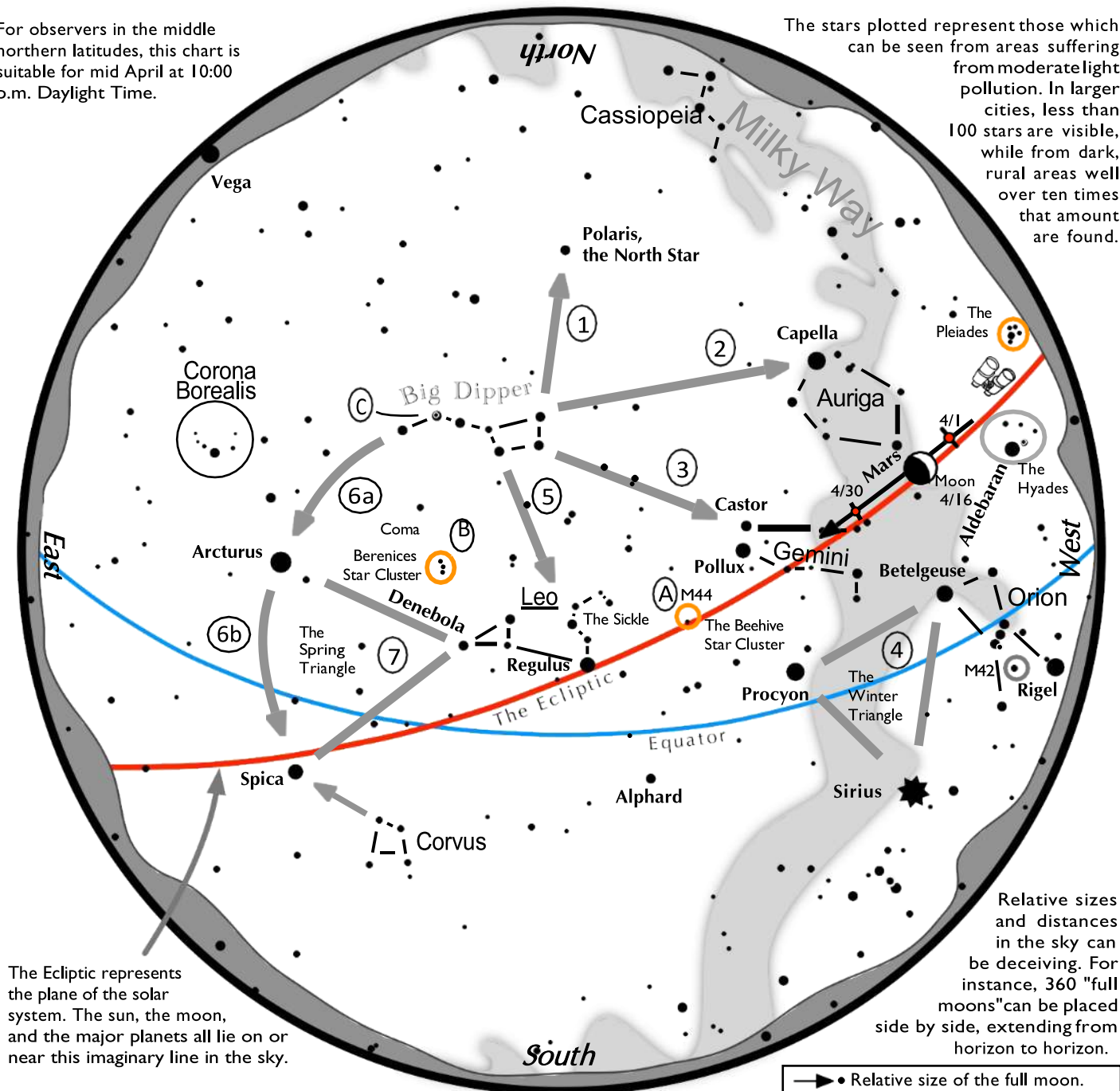


Whirlpool Galaxy M51 photographed by Sam.

Navigating the April Night Sky, Northern Hemisphere

For observers in the middle northern latitudes, this chart is suitable for mid April at 10:00 p.m. Daylight Time.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Navigating the April night sky: Simply start with what you know or with what you can easily find.

- 1 Extend an imaginary line north from the two stars at the tip of the Big Dipper's bowl. It passes Polaris, the North Star.
- 2 Draw another imaginary line west across the top two stars of the Dipper's bowl. It strikes Capella low in the northwest.
- 3 Through the two diagonal stars of the Dipper's bowl, draw a line pointing to the twin stars of Castor and Pollux in Gemini.
- 4 Look in the west-southwest for the bright Winter Triangle stars of Sirius, Procyon, and Betelgeuse.
- 5 Directly below the Dipper's bowl reclines the constellation Leo with its primary star, Regulus.
- 6 Follow the arc of the Dipper's handle. It first intersects Arcturus, then continues to Spica.
- 7 Arcturus, Spica, and Denebola form the Spring Triangle, a large equilateral triangle.

Binocular Highlights

- A: M44, a star cluster barely visible to the naked eye, lies to the southeast of Pollux.
 B: Look nearly overhead for the loose star cluster of Coma Berenices.
 C: In the Big Dipper's handle shines Mizar next to a dimmer star, Alcor.

Duplication allowed and encouraged for all free distribution.



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