



Jun 2004 Newsletter of the Omaha Astronomical Society Issue 198

Astronomy/Earth Day Omaha 2004



General Meeting of the
Omaha Astronomical Society
Friday, April 2nd at 7:30 PM
Durham Science Center, Room 169
UNO Campus

Program: See Page 3

Events

JUNE CLUB STAR PARTY

Saturday June 19, 2004

Club Site Weeping Water

MAHONEY PUBLIC STAR PARTIES

Friday June 11, 2004

Friday July 9, 2004

Friday August 13, 2004

Located at the golf driving range.

PLANNING MEETING FOR 2004

NEBRASKA STAR PARTY

10 June, 7:30 pm

Mahoney State Park Lodge

Join us and do your part to help plan NSP 10!

NEALE WOODS NATURE CENTER PROGRAMS

Phone number: (402) 453 - 5615

Done until Fall

OAS members are encouraged to help out with these events.

STELLA is a publication of The Omaha Astronomical Society. Please send related correspondence to: STELLA, c/o Omaha Astronomical Society, P O Box 540424, Omaha, NE



BULLETINS

June Meeting

To Be Determined

Good June Dates to Observe at the OAS Club Site or at any good location

Friday 11 June, last quarter moon
Saturday 12 June, last quarter moon
Friday 18 June, new moon
Saturday 19 June, new moon

Upcoming Events

SITE MAINTENANCE
Mowing & Trimming
12 June 10 AM



Venus Transits the Sun
June 8th
We will only see about 30 minutes of the
transit here in Nebraska

An Astronomy Quiz

This Month Quiz - Answers on page 11.

1. What is J0737-3039?
2. What is the current estimate of the size of the universe?
3. What is 2004 JG6?
4. Where is it's orbit?
5. What star was the first to be directly imaged as a disk?
6. In what constellation is it located?
7. What and where is NICMOS?
8. What star is the "Harp Star"?
9. What is unique about a Naysmyth focus telescope?
10. What is the picutre below?



Earth/Astronomy Day

Jeff Huston

Well, I think the Earth Day organizers may have hurt their turn out by postponing the Saturday event until Sunday... although the weather did indeed end up being better in general. And while the event, held at Memorial Park, was likely considered a disappointment for Earth Day in general... it was a huge success for Astronomy Day (I would guess that there were at least 1,000 people who came and went during the course of the day).

Early on... there were a few glimpses of sunspots provided by passing holes in the clouds... while another scope offered viewers the promise of stars in the daytime (the memorial flag!). Eventually the clouds cleared off in the late afternoon and we had three scopes going with a steady stream of people. Many brochures were picked up... both OAS and NSP.

Fortunately, those members who turned out were dedicated enough to stay the entire day with me! Thanks to Mark and Sharon Weiss and Cletus Baker (both of which brought scopes). Also thanks to Clark and Deb Cheney for hanging around a while and bringing out the 10" solar filter...I did eventually get to put it to use! And thanks to Kim Allen-Moss for helping all evening... manning a scope and answering questions. The foot traffic by our booth far exceeded our past years of going it alone with Astronomy Day at the Durham Science Center. I'd recommend we stay with this formula. The Earth Day folks seemed pleased with our presence as well.

June Sky Calendar

3rd of June Full moon
8th of June Venus transits the Sun
9th of June Last quarter moon
17th of June New Moon
20th of June Summer Solstice
25th of June First Quarter Moon

Recent Observing Awards

Mark Weiss received his Binocular Messier Certificate

Visit the club web site at: **www.OmahaAstro.com**

Save the club money... and get your newsletter in full color by signing up for the email edition of the Stella. Signing up is easy... just go to:

<http://www.omahaastro.com/digitalstella>

Welcome New Members...

No new members

Stellar Wanderlust – Arcturus, the Sun, and Barnard’s Star

Harlan Seyfer

Nothing is fixed.

Arcturus, the alpha star of Boötes the herdsman, is the brightest star north of the celestial equator and the fourth brightest in the sky. The three brighter stars — Sirius, Canopus, and Alpha Centauri — are all well south of the equator (our Sun of course is excluded from this list). “Arc to Arcturus” refers to following the arc of the Big Dipper’s handle to the star.

Arcturus means ‘guardian’ or ‘watcher of the bear’, since it follows Ursa Major across the celestial sphere. In fact Arcturus is one of the earliest stars to have its name passed down to us through history. The Greek poet Hesiodus referred to it by name around 700 BC. Some biblical scholars have Job naming it. The Greeks used Arcturus to mark the coming of spring, around the end of February back then.

Arcturus holds several records. Using a telescope of about 30X, Galileo observed it during the daytime in 1635. Thus Arcturus is the first star we know of to be observed in daylight.

Light from Arcturus was used to open the 1933 Chicago World Exposition. It was then believed that Arcturus was 40 light years distant. The Columbian Exposition had been held in the same city 40 years earlier in 1833 to celebrate the 400th anniversary of the discovery of America. Thus it was deemed fitting that light that left Arcturus at the time of the first exposition should be used, upon its arrival at Earth, to inaugurate the new exposition. A cool idea, except that we now know the distance to Arcturus is closer to 35 light years.

Of the 50 brightest stars, Arcturus has the second greatest motion across the dome of the sky at 2.281 arc-seconds per year. Only one other of the 50 brightest stars has a greater motion. Alpha Centauri or Rigel Kentaurus (take your pick; it goes by both names) zips along at 3.68 arc-seconds. (The fastest, Barnard’s star, flies at 10.31 arc-seconds, but at visual magnitude 9.5 it is too dim to be seen with the unaided eye.) By the way, astronomers refer to this a “proper motion” to distinguish it from “radial motion” towards or away from us. Robert Burnham Jr. in his *Celestial Handbook* states that Arcturus will pass us in several thousand years and

will fade below naked-eye visibility in 500,000 years. Unlike most stars Arcturus is not traveling in the plane of the Milky Way but is in a highly inclined orbit around the galactic center. It is a Population II star, which means it is a member of the stars originating in the halo surrounding our Galaxy. This explains its slanted orbit and high speed as it zips by us local folks in the galactic plain.

2.281 arc-seconds is small, about 1/3 inch at a distance of one mile. Nonetheless, Arcturus has a proper motion velocity of 72 miles per second. Even at that speed, it will take Arcturus about 789 years to travel the width of the moon. (By the way, this is not Arcturus' true velocity through space, since we have not taken into account its radial velocity towards or away from us.)

I've dwelled on the proper motion of Arcturus, because it started the whole proper motion thing, so to speak. Around 130 AD, Ptolemy wrote the *Almagest* in which he gave the positions of 1,022 stars (and declared that the Sun revolved around the Earth, but that's another story). These positions were based not only upon his measurements, but those of Hipparchus around 140 BC and Timocharis around 300 BC. In 1717 Edmund Halley, of the Comet fame, compared Ptolemy's position of Arcturus with its position in his day. Halley was surprised that to find that not only Arcturus but also Adebarran and Sirius had changed position. Arcturus had moved more than two moon diameters! Halley wrote in 1718, "What shall we say then? It is scarcely credible that the Ancients could be deceived in so plain a matter, three Observers confirming each other. Again their stars being the most conspicuous in Heaven, are in all probability the nearest to the Earth; and if they have any particular Motion of their own, it is most likely to be perceived in them."

All of the stars in the neighborhood of our sun, with the exception of a few halo stars just passing through, are traveling in the same general direction as the Sun around the center of the Galaxy at about 137 miles per second. Much like traffic on I-80, some drivers are going faster than this "average speed" and some slower. The astronomical term for this "average speed" is (somewhat paradoxically) the Local Standard of Rest (LSR). It is "at rest" only in the sense that it is fixed at a constant 25,000 (plus or minus 2,000) light years from the center of the Galaxy, neither moving closer to the center nor moving further away. So the local "star traffic" is moving at 137 miles per second. The Sun at the center of the LSR is traveling slightly faster around the Galaxy than its

fellow travelers, about 9 miles per second faster. It is also moving towards the galactic center at about 6 miles per second and up out of the galactic plane at 4 miles per second (changing lanes? Looking for an off ramp?). This works out to about 12 miles per second towards a spot between Hercules and Lyra, at right ascension $18^{\text{h}} 08^{\text{m}}$ and declination $+30^{\circ}$ called the solar apex.

Some simple arithmetic leads us to an interesting, if not downright fascinating fact: $137 + 12 = 149$ miles per second = 89.8 million miles per week. Compare this to the average distance of the Earth from the Sun, which is 92.9 million miles. In other words the Sun, in its attempt to escape the local stellar crowd, travels in a week a little less than the distance between it and the Earth!

The Sun is in a roughly elliptical orbit, according to Frank Bash, recently retired Director of McDonald Observatory. The Sun has a perigalacticon (closest distance to the galactic core) of 24,875 light years and an apogalacticon (farthest distance to the galactic core) of 26,750 light years. It takes about 240 million years for the Sun to complete one orbit. Since the Sun is approximately five billion years old, it is 21 galactic years old. The Earth is still a teenager at 18 galactic years. Life on Earth, a youthful 14 galactic years. Man — never mind, we're still in diapers.

The word “roughly” is used to describe the Sun's orbit, because it is “bobbing” in and out of the galactic plain. It is currently about 50 light years above the plain. Astronomer Bash estimates that the Sun will reach its peak of about 250 light years above the mid-plain in 14 million years, then will plunge back down to reach a point 250 light years on the other side, only to swing back to its current distance in 66 million years. The collective gravity of all the stars in the galactic disk causes this oscillation. The Sun makes 3 and 2/3 “bobs” every galactic year. The word “mid-plain” is used above, since the thickness of the Galaxy's disk at the Sun's distance from the center is about 700 light years. So, the bobbing Sun never really leaves the Galaxy.

One last bit of proper motion trivia: Proxima Centauri at 4.3 light years is the nearest star to the Sun. But Proxima is too far south to be seen from the United States. What is the closest star that can be seen from the US? The answer is the star with the greatest known motion across the sky, Barnard's Star at a neighborly 6 light years.

Arcturus, the solar apex, and Barnard's Star can all be seen at the Nebraska Star Party this year. I'll be looking for both. Hope you can make it. If not, keep looking up whenever, wherever you can.

Answers to Astronomy Quiz

1. The only known double pulsar.
2. 156 Billion light-years across.
3. Newly discovered asteroid.
4. Inside earth's orbit, oval shaped.
5. Betelgeuse.
6. Orion.
7. Near Infrared Camera and Multi-Object Spectrometer, on the Hubble.
8. Vega.
9. The focuser is at a fixed height, through the pivot point.
10. M37



Mark Weiss introduces an Earth Day attendee to the wonder of sunspots.



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BENEFITS OF MEMBERSHIP

- ◆ Members receive the STELLA, our monthly newsletter.
- ◆ Each member is automatically a member of the Astronomical League, the only nation-wide organization for amateur astronomers.
- ◆ Use of the observing site at Weeping Water, NE
- ◆ The opportunity to borrow one of several club-owned telescopes.
- ◆ Organized trips to local observatories, planetariums and museums.
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