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Star Points for December 2009

“Those Awesome Auroras”

by Curtis Roelle

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The Scandinavian peoples inhabit the countries of Sweden, Denmark, Norway, and Iceland. In Scandinavian, or Norse, mythology, Valhalla was the residence of Odin, the all-wise lord of the sky and father of the gods. According to the 19th Century mythology authority Thomas Bullfinch, Valhalla was the most beautiful of the silver and golden palaces in Asgard, the abode of the gods, located on the other side of the Bifrost Bridge – the rainbow. The name Valhalla, incidentally, was included in the lyrics of the British rock band Led Zeppelin’s “Immigrant Song,” with the cry, “Valhalla, I am coming!”

In Valhalla, Odin feasts with chosen heroes who have fallen bravely in battle. Excluded is anyone whose death was peaceful. Odin’s agents are the Valkyries, whose name means “choosers of the slain.” The Valkyries, commemorated in Richard Wagner’s opera *Die Walküre* (*The Valkyrie*), were warlike, horse-mounted virgins wearing helmets and armed with spears. Their primary function was to visit every battlefield to select which slain warriors were carried to Valhalla to be honored at the nightly feast.

According to Norse mythology, when the Valkyries ride, their armor shines with a shimmering light, flickering and flashing in the northern sky. We know this glow as the *Aurora Borealis*, or the “*Northern Lights*,” and we know its cause to be solar radiation interacting with Earth’s magnetic field.

The outermost layer of the sun’s atmosphere is a tenuous plasma of ionized particles expanding outward to form the “solar wind.” When particles swept along in the wind encounter Earth’s magnetosphere – a region of space surrounding Earth in which its magnetic field dominates – they are forced to detour around the planet.

(Continued on page 3)

Come one, come all!

WASI HOLIDAY DINNER

For WASI Members and Their Families

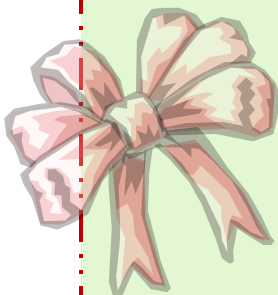
Wednesday, December 9, 2009

Bear Branch Nature Center

Time: 7:00 p.m.

POT LUCK BRING A DISH

(More on page 2)



President's Message for December

by Stephen Reisinger

Starlab, the portable planetarium, will be at Garrett's school the week of December 14-18. I hope to do a program for the 4th- and/or 5th-graders sometime during the week. If we are fortunate enough to have clear weather, and especially if sunspots are present, I'll also set up my telescope.

The following week will be Christmas. Since we'll be spending this time with Becky's parents, I hope to take Garrett out on one of the nights we're there to look at the night sky. We can drive in any direction for about a half hour and be in the middle of farm country. It's wonderfully dark, with very few trees, and you can see just about the whole sky from horizon to horizon. If we can spend even a couple of hours outside together, before it gets too cold for Garrett, I'm sure he'll enjoy himself (me, too). I'll let you know next month how things worked out.

I hope you and your families all have a very Merry Christmas and a Happy New Year!

Clear skies,
Stephen

The WASI HOLIDAY POTLUCK DINNER



The WASI Holiday Party is fast approaching. We are having a potluck dinner again this year. It will be held in place of our monthly meeting, on Wednesday, December 9, at 7:00 p.m., at Bear Branch Nature Center. Please note that the time – 7:00 p.m. – is a half-hour earlier than our usual meeting time.

Please bring one or more of your favorite dishes, salads, or desserts. The club will provide soft drinks. It will also provide paper plates, cups, paper towels, plastic table covers, forks, spoons, and knives.

Reminder: This party is for members only, and their families and friends.

New WASI Members: WELCOME !

WASI extends a warm welcome to Phillip Eakens, of Westminster, and to Bruce Smith, of Manchester, who both joined us recently.

Star Points, *Cont.*

Some particles get trapped within Earth's magnetic field and spiral along the field lines toward the planet's poles, where they interact with the ionosphere, causing a glow typically at an altitude of 60-80 miles above the surface of Earth.

Auroras can appear in many shapes. There are curving "arc" auroras, folded "curtain" auroras resembling drapery, irregular "band" or cloudy "patch" auroras, glowing uniform "veils," or linear shaft-like "ray" structures. One particular type of aurora resembles a picket fence in the sky.

The colors of an aurora may also vary depending on the type of ion that is being excited. Oxygen can glow either green, yellow, or a brownish-red. The red auroras occur high in the atmosphere, up to 200 miles above Earth, and so are seen *above* the greenish or yellow auroras. At lower altitudes, ionized nitrogen glows reddish-purple. In my experience green is the most commonly seen color.

An aurora is occurring somewhere on Earth at any given time. They are most commonly seen at high northern latitudes, such as in Alaska and Canada. More rarely, when the solar wind is stronger because of activity on the sun, they can become visible farther south. Very intense auroral storms have even been observed from the tropics. Auroras occurring in the southern hemisphere are referred to as the *Aurora Australis* (the *Southern Lights*).

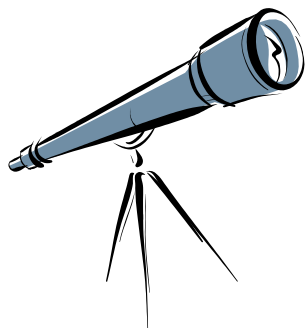
Auroras are hard to predict, and the secret to spotting one is to search the northern sky on a clear night for anything unusual. Faint auroras can appear whitish and be confused with clouds. A notable difference is that stars shine undiminished right through an aurora, whereas stars are dimmed by clouds.

I've observed auroras from various locations in Carroll County, including Bear Branch Nature Center (BBNC), where the Westminster Astronomical Society is hosting a public star party on the night of Friday, December 18. Of course, there is no guarantee that an aurora will be visible on any given night. A planetarium program will be presented at 7:30 p.m. Reservations are recommended for the planetarium program (call 410-386-2103), and there is a nominal fee. However, there is no charge for the free outdoor star party, with observing through Society members' telescopes, weather permitting. Please remember to dress warmly.

"Star Points" by Curtis Roelle appears in the Carroll County Times on the first Sunday of each month. Visit the website at <http://www.starpoints.org> or send e-mail to StarPoints@Gmail.com.

WASI Observing for December 2009 and Early January 2010

by Steve Conard, Observing Chair



Our November observing night was one of the better ones for 2009. Clear, reasonably transparent skies, and not very cold! Seven members and friends attended.

I've found that balancing my time at these events is always a challenge. I'm pulled back and forth between the eyepiece (or the monitor if I'm imaging) and the various interesting conversations among the members in attendance.

The conversations have topics all over the map. While most are either astronomy or club related, many times we end up discussing travel, other hobbies, family, and friends. I think I'd have a great time even if I just showed up with a cup of coffee and chatted the entire time. I'm not sure why standing in the coolness of a November evening in the dark leads to more interesting discussions than in other, more comfortable environments, but it sure seems to.

As the nights grow colder with the onset of winter, we should be enjoying a bit clearer skies. I hope to see a few new faces at our future observing sessions. We are almost up to what I consider to be the "critical mass" we need. This is the point where we'll be assured of enough attendees, so that members won't think, "But I might be the only one attending..." and stay home, which seems to turn into a self-fulfilling prophecy.

WASI Observing Weekend

Our December observing nights will be [Friday and/or Saturday, December 11 and 12](#). We've cycled back a bit, with five weeks since our last observing session, and are now close to New Moon, with moonrise after 3:30 a.m. This is also near the day of earliest sunset, about 4:45 p.m., allowing you to begin dark-sky observing before 6:00 p.m. Also, the athletic field lights are typically off in winter. Unfortunately, I'll be sidelined for these evenings at a family commitment in South Carolina. I'll ask one of the other "regulars" to coordinate the evening.

The Geminids

The Geminid meteor shower peaks on the night of December 13-14, near New Moon. You can expect up to 100 meteors per hour – one of the top showers of 2009. This shower has the advantage that its radiant is well up in the East by 9:00 p.m., and you can start observing around that time. Don't forget to log your observations if you want to qualify for the Astronomical League Meteor Club (See November *MDA*, page 4, for more information).

Mars



Mars will soon be coming into a convenient viewing time, with opposition occurring on January 29, 2010. While the maximum size during this opposition will only be about 14 arcseconds, Mars will be very high in the sky, making the steadiness of the atmosphere somewhat less problematic.

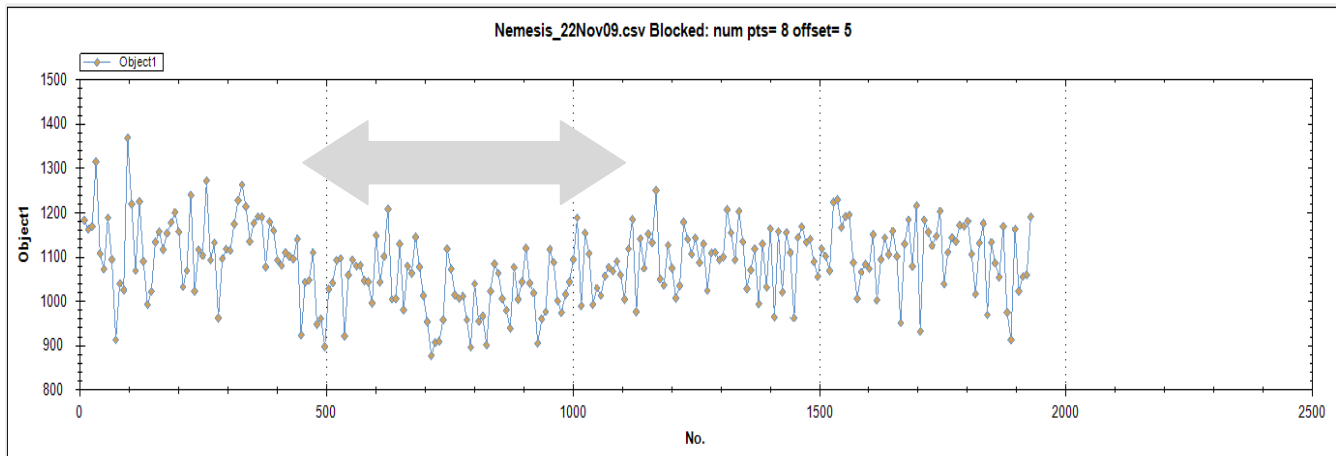
You may want to begin plotting Mars' position on a copy of a star map (enlarged, if needed), and continue this weekly until about March (or later!) to illustrate planetary retrograde motion. The Astronomical League's "Planetary Observers/Solar System Observers Club" (POC) requires this exercise, and Mars only comes to opposition every 26 months.

Mars is currently moving in its normal, "prograde motion," west to east against the background of the stars, headed toward Regulus (in the constellation Leo). On December 21, it will reach its "stationary point," and suddenly appear to reverse direction, drifting westward in "retrograde motion" back toward the constellation Cancer. This illusion is caused by the motion of the Earth, on the faster "inside" track, as it catches up with, and passes, the slower Red Planet, causing Mars to appear to be moving backward. As Mars returns to prograde motion, its path traces a "loop" in the sky. The POC task requires you to plot the apparent motion of Mars through this retrograde loop. As Mars approaches opposition, you will want to make more frequent observations, since changes occur faster. For more information, see <http://www.astroleague.org/al/obsclubs/plantry/pocinnss.html>.

Asteroid Occultations

November. Both listed local asteroid occultations for November had clear skies. The Emma event on November 20 was a miss here in Carroll, as the path ended up passing to the East. At least one observer in the Boston area had a positive, so our negative observations do provide a constraint on the width of the asteroid.

The Nemesis event on the November 22 was a positive here in Carroll, but it also proved to be one of the most challenging data analyses I've dealt with in the hobby. The asteroid was magnitude 11.4 – relatively bright – but the star was only magnitude 13.3. This caused the delta magnitude, *i.e.*, the change in magnitude during the actual occultation, to be less than 0.2 magnitude. The graph below shows the dip in signal from the CCD while the occultation is occurring. The dip in signal is less than 10% of the combined signal. The X-axis is video frame count (1/30 of a second steps), and the Y is measured signal from the combined star/asteroid image for the average of each 8 frames. The gray arrow shows the occultation. IOTA's Occular software was able to find this event repeatedly with error bars of ± 0.5 seconds, giving a 90% confidence that the event was valid. John Menke had a similar positive that matches this data, giving us two chords across this asteroid.



December. There are two outstanding events around the first of the year:

30 Dec 09 03:18 Elektra over 12.8 mag star (84%) – All of Carroll County

07 Jan 10 21:13 Juewa over 9.3 mag star (100%) – South edge of shadow over Carroll County

The Juewa event is one of the best 2010 events for Carroll County, and can be observed visually with a modest-sized telescope.

The stated percentage is the estimated chance for a *pair* of properly located stations to have one or more detections. The geographic location indicates the maximum chance of detection, although all of these have a reasonable chance of occurring anywhere in Carroll County.

Regional Star Parties

Next month we'll list the major mid-Atlantic star parties for 2010. It's never too early to begin planning for the warmer months.

December 1984



25 Years Ago...

by Curt Roelle

Twenty-five years ago this month the monthly meeting wasn't held as usual at Western Maryland College. In those days we were meeting on the last Wednesday of the month, and the college was closed for the holidays. We didn't yet have the tradition of a holiday dinner, so we met at the Westminster branch of the Carroll County Public Library. The guest speaker was the late Harrison Gilmer, retired.

Mr. Gilmer's lecture was entitled "A Newtonian Satellite Distance Formula: The Titius-Bode Law of Planetary Distances, Amended." Don't be surprised if you have not heard of Titius-Bode (T-B). The original "law" was published in the second half of the Eighteenth Century. T-B was an empirically derived formula for explaining the planetary distance relationship.

T-B predicted an unknown planet beyond Saturn, located 19.6 astronomical units from the sun (1 AU equals the average Sun-Earth distance, or 93 million miles). In 1781 William Herschel discovered the planet Uranus at 19.2 AU! T-B also predicted a planet between Mars and Jupiter at 2.8 AU. In 1801 Giuseppe Piazzi discovered the dwarf planet Ceres at 2.77AU! T-B appeared to be onto something.

For planets farther out, however, T-B's predictive ability was less impressive. It predicted the eighth and ninth planets at 38.8 and 77.2 AU, respectively; but Neptune and Pluto were discovered at 30.1 and 39.4 AU. Pluto, which is no longer categorized as a major planet, seems to be way off

Mr. Gilmer reported on his efforts to update T-B, taking into account other objects discovered in the meantime, such as the asteroid Chiron and the known major planetary moons. Amazingly, Gilmer's improved T-B Law placed Neptune and Pluto at their true distances: 30.1 and 39.4 AU, respectively!

Based on his numeric analysis, Mr. Gilmer predicted, at the WASI meeting in 1984, the existence of a planet 70 AU from the sun in the Oort comet cloud. In 2005, twenty-one years later, Eris, the largest of the known dwarf planets, was discovered at 67.7 AU.

Mr. Gilmore donated a summary of his predictions to the club. The tables may be found in the club archives.

Those who have been attending the meetings and lectures over the years know that WASI is open to receiving new ideas in astronomy, even if highly controversial and not necessarily favored in the mainstream view. Big advances in astronomy usually don't come without a paradigm shift. Consider the cases of Galileo, Copernicus, or even Titius-Bode.

6TH ANNUAL EASTERN ASTRONOMY SHOW

Steve Conard, Observing Chairman

Hands on Optics, in Damascus, Maryland, presented the 6th Annual Eastern Astronomy Show on Halloween. Owners Sherry and Gary Hand hosted this daylong event at their store, using a large tent in the parking lot for the day's presentations. Representatives from a number of vendors were on hand to give seminars on their latest offerings, and to talk with the attendees one-on-one. These vendors included Celestron, Meade, Stellarvue, Vixen, and others.



Gary Hand of Hands on Optics (Photo by Curt Roelle)



Tom, Curt, Steve, and Bob killing time while waiting for 1) clouds to uncover the sun, 2) the next presentation, 3) more pizza?

The weather, while very warm for late fall, was unfortunately cloudy and windy, and only a few brief periods of solar observing were possible during the day. The keynote speaker was Nancy Roman, formerly one of the leading scientists directing NASA's astronomy research from the 1960's to the 1980's. We all found her discussion of various NASA astronomy missions in the early years very interesting.

Approximately eight WASI members attended for various parts of the day. There were hourly drawings, and WASI's own Tom Lipka won a Celestron FirstScope to add to his collection. Free food – hot dogs, pizza, chips, and soda – was available throughout the day, and WASI members were up to the task of ensuring that Sherry and Gary would have no leftovers to concern themselves with at the end of the show.

Many thanks to Sherry and Gary for putting on this great yearly event, as well as for all the other things they do to promote the hobby in Central Maryland.



Tom, Gary, Curt, and Alf enjoying the show

THE WINTER SOLSTICE: FACT AND FICTION

by Pam Lubkans

Winter solstice will occur at 12:47 p.m. EST on December 21 this year. Most people believe this day to be the shortest day of the year, *i.e.*, the day with the least amount of daylight. The table below shows that they're right! December 21 will indeed be the shortest day of the year, with only 9 hours and 23 minutes of daylight here in the Westminster area.

Quite a few people also believe that on the day of the winter solstice the sun rises the latest and sets the earliest of any single day of the year. The table below shows that this is not true.



	<u>DATE</u>	<u>SUNRISE</u>	<u>SUNSET</u>
2009	November 30	07:09 a.m.	16:45
	December 1	07:10	16:44
	December 2	07:11	16:44
	December 3	07:12	16:44
	December 4	07:13	16:44
	December 5	07:14	16:44
	December 6	07:15	16:44
	December 7	07:15	16:44
	December 8	07:16	16:44
	December 9	07:17	16:44
	December 10	07:18	16:44
	December 11	07:19	16:44
	December 12	07:20	16:44
	December 13	07:20	16:45

	December 21	07:25	16:48

	December 30	07:28	16:53
	December 31	07:29	16:54
	January 1, 2010	07:29	16:55
	January 2	07:29	16:56
	January 3	07:29	16:57
	January 4	07:29	16:58
	January 5	07:29	16:58
	January 6	07:29	16:59
	January 7	07:29	17:00
	January 8	07:29	17:01
	January 9	07:28	17:02





The table shows other interesting facts as well, including the following:

- 1) Both the earliest sunrise and the latest sunset remain “parked” at the extreme value for over a week: 12 days for the sunsets, and 9 days for the sunrises.
- 2) The earliest sunset of 2009 did not wait politely until December 21, but occurred on December 1. Also, the *period* of earliest sunset ended on December 13, short of the solstice.
- 3) The latest sunrise of the season, similarly uncooperative, will dally in its arrival until January 1, 2010, and the late-sunrise time will remain seemingly parked at 07:29 a.m. until January 9. (The latest sunrises of Calendar Year 2009 actually occurred on January 1-8, having begun on December 31, 2008.)
- 4) On the day of the winter solstice, the sunrise will be four minutes earlier than on January 1-8, and the sunset will be four minutes later than on December 1-12.

Why such asymmetry? Astronomers tell us that it’s primarily due to 1) the eccentricity of the earth’s orbit, and 2) the obliquity of the ecliptic (read: the tilt of the earth on its axis as it revolves around the sun). The combined effect can be represented mathematically, and graphed, as the *equation of time*.

Despite the sunrise-sunset times shown in the table above, some people assume that at this time of year the precious nine-plus hours of daylight that we enjoy here in the Westminster area are divided into two *equal* portions: the hours before noonday and the hours following it. Whether their assumption is fact or fiction depends upon the type of time-measuring device they use. An accurately positioned sundial divides our daylight hours faithfully around the noonpoint all year long, invariably. A clock, or watch, however, does not.

There’s more. Astronomers also tell us that when time is measured by the apparent movement of the sun alone, and not by our clocks – using a sundial, for example – the days themselves are not equal in length. Our clocks “assume” days of equal hours, minutes, and seconds, and do not allow for varying lengths of days, “averaging” the time differences.

Luckily for us, over the course of the year, it all works out. The clock and the sundial agree perfectly four times a year: near the winter and summer solstices, and around April 15 and August 30.

In this season of gift-giving, a sundial might make a very nice gift, either to give or to receive. If so, be careful when choosing: many sundials on the market are designed for 30°N and are *not* adjustable. It’s important that you find an adjustable one that you can set precisely to our 39°-plus latitude here in the Westminster area.

Credits: Almanac data obtained from

http://fermi.jhuapl.edu/temp/almanac/westminster/2009/Sun_NOV_2009.pdf

http://fermi.jhuapl.edu/temp/almanac/westminster/2009/Sun_DEC_2009.pdf

http://fermi.jhuapl.edu/temp/almanac/westminster/2010/Sun_JAN_2010.pdf



A Cosmic Crash

by Patrick Barry and Dr. Tony Phillips

Two small planets hurtle toward each other at 22,000 miles per hour. They're on a collision course. With unimaginable force, they smash into each other in a flash of light, blasting streams of molten rock far out into space.

This cataclysmic scene has happened countless times in countless solar systems. In fact, scientists think that such collisions could have created Earth's moon, tilted Uranus on its side, set Venus spinning backward, and sheared the crust off Mercury.

But witnessing such a short-lived collision while pointing your telescope in just the right direction would be a tremendous stroke of luck. Well, astronomers using NASA's Spitzer space telescope recently got lucky. "It's unusual to catch such a collision in the act, that's for sure," said Geoffrey Bryden, a cosmic Crashspitzer, *i.e.*, an astronomer specializing in extrasolar planet formation at NASA's Jet Propulsion Laboratory and a member of the science team that made the discovery.

When Bryden and his colleagues pointed Spitzer at a star 100 light-years away called HD 172555, they noticed something strange. Patterns in the spectrum of light coming from nearby the star showed distinctive signs of silicon monoxide gas – huge amounts of it – as well as a kind of volcanic rock called tektite.

It was like discovering the wreckage from a cosmic car crash. The silicon monoxide was produced as the high-speed collision literally vaporized huge volumes of rock, which is made largely of silicon and oxygen. The impact also blasted molten lava far out into space, where it later cooled to form chunks of tektite.

Based on the amount of silicon monoxide and tektites, Bryden's team calculated that the colliding planetary bodies must have had a combined mass more than twice that of Earth's moon. The collision probably happened between 1,000 and 100,000 years ago – a blink of an eye in cosmic terms.

The scientists used the Spitzer space telescope because, unlike normal telescopes, Spitzer detects light at invisible, infrared wavelengths. "Spitzer wavelengths are the best wavelengths to identify types of rock," Bryden says. "You can pin down which type of rock, dust, or gas you're looking at."

Bryden says the discovery provides further evidence that planet-altering collisions are more common in other star systems than people once thought. The "crash-bang" processes at work in our own solar system may indeed be universal. If so, Spitzer has a front row seat on a truly smashing show.

See Spitzer Space Telescope's brand new Web site at <http://spitzer.caltech.edu/>. Kids can learn about infrared light and see beautiful Spitzer images by playing the new Spitzer Concentration game at <http://spaceplace.jpl.nasa.gov/en/kids/spitzer/concentration/>.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



Artist's rendering of cosmic collision involving two objects whose combined mass was at least twice that of our Moon. Discovered using the Spitzer Space Telescope in the planetary system of a star called HD 172555, 100 light-years away.

Next Month:

**January General Meeting
Annual Business Meeting and Election of Officers
Wednesday, January 13, 2010**