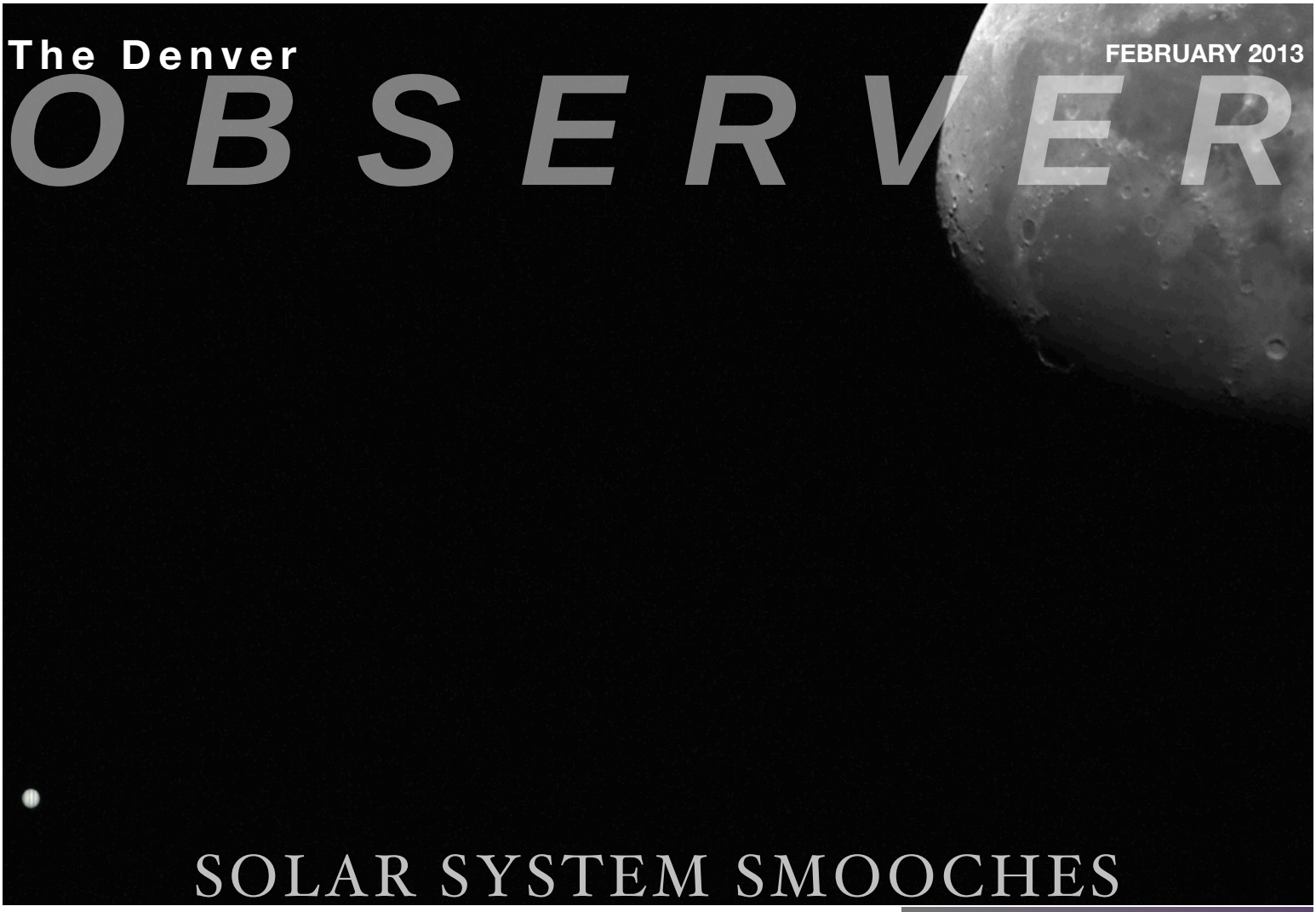
The Denver
OBSERVER
FEBRUARY 2013



SOLAR SYSTEM SMOOCHES

JUPITER AND THE MOON CONJUNCTION

On Jan. 21, 2013, the moon and Jupiter cuddled up in our view of the sky. They came within 29 arcminutes of each other—this will be the closest conjunction of these two unearthly bodies that we in the U.S. and Canada will see until the year 2026. David used a Canon 400D camera on a Stellarvue SVR105 refractor. Nicely done!

Image © Dave Wolf

Calendar

3.....Last quarter moon

10.....New moon

17..... First quarter moon

25.....Full moon

Inside the *Observer*

FEBRUARY SKIES

by Dennis Cochran

The stars wheel across the clear winter skies while we wrestle with our earthly affairs. Jupiter continues to shine in our show, full of fascinating details and giving us reasons to go to the high-power eyepiece. The dark of the moon will occur on Sunday the 10th surrounded by nearly moonless nights. Orion and the famous M42 nebula hog the stage with Jupiter. Orion's Big Dog, Canis Major, gets far enough above the horizon to the be fully seen, as well as Lepus the Hare, the fainter constellation underneath Orion. Perhaps Canis Major is chasing the hare? Canis Major is jumping up with excitement, his body vertical. The Canis Major-plus-Puppis region, the latter south of Canis Major, is swarming with stars. You might want to start your observing with a binocular or wide-field scope, sweeping the area with no particular agenda. Then look for the clusters mentioned below.

Open cluster M41 lies along the big dog's body, just to his right about chest-high. Another cluster, M93, is east of the several stars at the tail-end of the dog. If you can see that far south, cluster NGC 2477 marks the top of Puppis, down at $7^h\ 52^m$ -39°.

Over in the southwest, in the region above-left of Capricorn is the big, sloppy constellation Aquarius the Water-Bearer. It may be hard for we modern-day folks with our water faucets, to remember how many man and woman hours have been spent by humans carrying water from where it is to where we want it. His alpha star is below the theta and epsilon stars of Pegasus, which we mentioned last month because they are the end of his

Continued on Page 3

PRESIDENT'S CORNER

by Ron Pearson

***"Why are we out here chasing comets?"*—Commander William Riker, U.S.S. Enterprise E., sometime in the mid-24th century.**

2012 was good year for urban astronomy. We witnessed the transit of Venus, the partial or annular eclipse of the Sun and a great apparition of Saturn—all seen nicely from the city. Unfortunately wildfire haze and oil drilling lights obscured our dark skies and disrupted faint fuzzy observing. But in the 21st century year of 2013 we are looking forward to the possibility of two very good or even "great comets" as Darrell Dodge described in the December *Observer* that will need dark skies.

I don't know about you, but I'm already planning and getting ready for these visitors from the outer limits of our solar system. I hope you have either a *Sky and Telescope* or *Astronomy* magazine, or have looked online for good viewing times and positions of the comets as they head into and away from our sun. These comets will be a real test of the "patience" of the public (not just for media hype that is likely to occur), and a huge opportunity to point out the effects of our unneeded, uneconomical and downright detrimental 21st century light pollution. People will want to know where to go see the comets, and if they can be seen from their backyards with all the porch and house lights on? Well, no they can't. Many will be content to see them on the big screen TV from their couch. But many, and I hope you, will get up off the couch, turn off the TV and go somewhere dark to really see them at their best. Why are we out here "chasing comets?" There is nothing, repeat nothing, more beautiful to see in the night sky than a comet with its ghostly tail stretching across a third or more than half of the sky before dawn or just after sunset. Even hard-core nerdy scientist astronomers will look up from their LCD screen of spectrometer plots to go out and look. Because of light pollution this is going to take a little more forethought and planning than just driving to Chamberlin or stepping out on your driveway under the street lights expecting to see a vision or miracle.

Good comet viewing requires dark skies, away from the urban domes of light. Coming in mid-March rising from the southern hemisphere, Comet PanSTARRS will be up in the western sky for 10 days or so. Then, in November, Comet ISON will be a "comet of the century" (we hope), with a tail bright enough to see during daylight and that will stretch across a good portion of sky. Now is the time to plan, to figure out what is the best viewing or photography tools for you. Comets are different than most astronomical objects we observe. First, if they turn into good or great comets, they are BIG! Yes, they're miles across in space, but if and when they develop a bright, long tail or tails, you can't be observing them with that high power cheap refractor you have stored in your closet because it would be like looking at your beautiful significant other through a straw. A nice pair of binoculars may be the best way to view these comets. Have you got a decent pair of 7x50 (or larger) binoculars and have you got a way to hold them for many minutes or hours so your arms aren't quickly tired out? If you want to try photographing the comets; what have you got, or what do you need to find out? Viewing locations; even just being at a dark site (like ours) is no guarantee of good views, because comets tend to follow and lead the Sun. They are best seen when rising in the east near dawn or setting in the western sky. You need clear, low horizons with no or few obstructions, and no light domes in the same part

Continued on Page 5

DAS SCHEDULE

FEBRUARY

1 E-Board Meeting at Chamberlin (Begins at 7:30 P.M.)
8-10 EGK Dark Sky weekend
16 Open House at Chamberlin Observatory (Begins at 6:00 P.M.)
22 Annual Meeting at D.U.'s Olin Hall: Election of Officers and speaker Bill Tschumy on *SkySafari, see Back Page* (Begins at 7:30 P.M.)

MARCH

1 E-Board Meeting at Chamberlin (Begins at 7:30 P.M.)
8-10 EGK Dark Sky weekend (Messier Marathon)
10 Daylight Saving Time Begins
16 Open House at Chamberlin Observatory (Begins at 7:30P.M.)
23 Spring Banquet and Installation of Officers at 6:00 P.M. (See Page 4 and Back Page).
26 Passover Begins
31 Easter

Public nights are held at Chamberlin Observatory every Tuesday and Thursday evenings beginning at the following times:
March 13 - April 14 at 8:00 P.M.
April 15 - August 31 at 8:30 P.M.
September 1 - September 30 at 8:00 P.M.
October 1 - March 10 at 7:00 P.M.
Costs to non-members are: $3.00 adults, $2.00 children.
Please make reservations via our website (www.denverastro.org) or call (303) 871-5172.

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The Executive Board conducts the business of the DAS at 7:30 p.m. at Chamberlin Observatory. Please see the Schedule of Events for meeting dates. All members are welcome.

www.denverastro.org

FEBRUARY SKIES

(CONTINUED FROM PAGE 1)

southwest leg that points to M15. Way below α (alpha) Aqr. at 22^h 30^m -15° is the faint galaxy pair NGCs 7300 & 7302. Then way, way west of that around 21^h is the trio NGC 7009 (Saturn planetary nebula), cluster M73 and globular M72. Much closer to α (alpha) Aqr., at the same right ascension (r.a.) as NGCs 7300/7302 but only five degrees south is a pair of quasars 3C 446 and PKS 5300. See if you can see anything there.

The Beehive Cluster, M44, is upon us in the center of the upside-down Y of Cancer the Crab, following Gemini across the sky just under the zenith. The moon will be almost full while it's at the end of the left-hand leg of Cancer on the 24th. Looking at the ecliptic, Regulus, the bright chest star of Leo the Supine Lion, lies farther east. Looking west along the ecliptic, which lies a bit above the celestial equator, our eyes glide between the pointed horns of Taurus the Bull and continue way west to the sloppy V of Pisces the Fish(es). Jupiter is on the ecliptic, and above him the Pleiades (Photo right) and then the strangely-shaped constellation (a walking man?) of Perseus the Hero. The California Nebula is down along his trailing leg, and up in the busy region surrounding his alpha star Mirfak is the Alpha Persei Association, a wide cluster of stars also known as Melotte 20. Upper-right from Mirfak and just east of the gamma star is NGC 1220, a small cluster. The delta star is below alpha and is the branch-off-site for a line of stars going east and crooking north to the lambda star of Perseus. Upper-left of lambda is cluster NGC 1528.

And of course off of the pointed head of the hero, in the direction of W-shaped Cassiopeia is the Double Cluster, one of the first objects that astronomers learn to locate. Down the leading leg of the hero is the famous "Demon Star" Algol, the beta star of this constellation—a variable with a period of 69 hours. This is an eclipsing binary and its light variation can be seen without a telescope. Upper-right from Algol is M34, an open cluster big enough to be a fuzzy patch to the naked eye. There is a lot of action around our hero. Join him in his adventures as you check out his piece of sky. ★

SISTERLY LOVE

This shot of M45 (the Pleiades), also known as the Seven Sisters, was made on January 5, 2013, at the CosmicRock Observatory; the temperature was 6˚f (Burr!) It is an image stack of nine 5-min. exposures. Ron used an unmodified Canon 400D on a C-80mmED with a Televue 0.8x focal reducer-flattener, Astronomik CLS filter, piggy-backed & guided on 12-inch Newtonian. The image is cropped about 1/3. Imaged with "Nebulosity," guided with PHD and processed with "Nebulosity" and "CS 3 Photoshop" on a Macbook Pro.

Image © Ron Pearson

ABOUT THE DAS

Membership in the Denver Astronomical Society is open to anyone wishing to join. The DAS provides trained volunteers who host educational and public outreach events at the **University of Denver's Historic Chamberlin Observatory,** which the DAS helped place on the National Register of Historic Places. First light at Chamberlin in 1894 was a public night of viewing, a tradition the DAS has helped maintain since its founding in 1952.

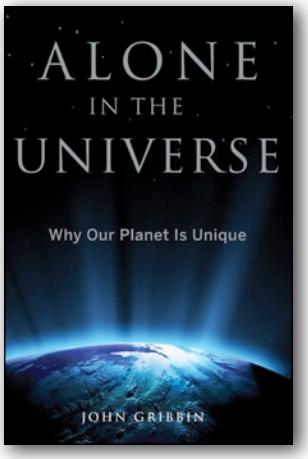
The DAS is a long-time member in good standing of the **Astronomical League** and the **International Dark Sky Association.** The DAS' mission is to provide its members a forum for increasing and sharing their knowledge of astronomy, to promote astronomical education to the public, and to preserve Historic Chamberlin Observatory and its telescope in cooperation with the University of Denver.

The DAS is 501 (c)(3) tax-exampt corporation and has established three tax-deductible funds: the Van Nattan-Hansen Scholarship Fund, the DAS-General Fund and the Edmund G. Kline Dark Site Fund.

More information about DAS activities and membership benefits is available on the DAS website at *www.denverastro.org.*

BOOK REVIEW: *ALONE IN THE UNIVERSE, WHY OUR PLANET IS UNIQUE,* BY JOHN GRIBBIN, JOHN WILEY & SONS, DECEMBER, 2011

by Darrell Dodge



William Herschel thought there were probably humans (or other intelligent beings) on the moon. Percival Lowell, like many others at the turn of the 20th century, was convinced there was intelligent life on Mars. Carl Sagan, a skeptic who nonetheless believed that the universe was probably teeming with advanced civilizations, led the campaign to include a phonographic "welcome" to other intelligent beings on one of the Voyager space probes that is now nearing the edge of the heliosphere. And, one of the objectives of the current campaign to discover exoplanets in the habitable zones around nearby stars, is to find a place that would harbor technologically advanced beings with whom we can communicate. No doubt many of the readers of this review (being amateur astronomers) probably observe distant galaxies through their telescopes or cameras thinking that there is a high probability that someone intelligent is "looking back" at them, given the huge number of stars in a spiral galaxy and the huge number of planets that are probably orbiting those stars.

But what if we are all wrong, and there is no one else like us—or nothing else like our smart-phone and car crazy technological civilization—in the entire universe? Nothing, Zip. Nada.

As the perceptive reader might have guessed from the title, that is the premise and conclusion of John Gribbin's latest book.

I have avoided reading John Gribbin's books for years (I can see now unfairly) because of his self-refuted 1974 book *The Jupiter Effect,* which falsely predicted that a coming alignment of the planets would cause earthquakes around the globe and slide California into the Pacific.

Alone in the Universe is different. Firmly rooted in the insights of modern astronomy, astrobiology, and the development of the history of life and humans on Earth; drawing from insights and conjectures of thinkers from Lovelock to Fermi, and thoroughly conversant in the recent discoveries of hundreds of exoplanets, Gribbin sets out to not to affirm, but to destroy the fond hope of humans that we are not alone.

Gribbin's analysis begins with a discussion of various theoretical models, equations, and thought experiments that have been developed by Charles Linneaweaver, Frank Drake, Michael Shermer and Enrico Fermi (who famously asked "where are they" when contemplating the lack of alien contacts), to assess the probability that other civilizations like ours exist. These turn out to be fairly unsettling in themselves for those wanting to hope that we are not alone.

Turning to more tangible evidence found in observations of the universe, he structures the core of his analysis with a repeating rhetorical question: "What's so special about . . ." This explores our place in the Milky Way, the characteristics of our Sun and the development of the Solar System, the location and dynamics of Earth's place in the solar system (including our fortuitous friends, our huge moon and Jupiter), the development of Earth and the Cambrian Explosion, the characteristics and charmed history of the human race and the three very special characteristics of water—the precious solvent on which life on Earth depends (and which we bold humans are throwing down thousands of fracked well holes).

I was skeptical at first, but somewhere in the midst of his discussion of "What's so Special About the Sun?" I started to think that he really did have something. Among the suspicious differences of Sol are its highly unique stability; the quite narrow bounds of its habitable zone, where water can exist in liquid form; the sun's very slow evolution (allowing a generous period of time when complex life could evolve), the fact that 95% of the stars in the universe are smaller than the sun and most of these smaller stars (including red dwarfs) are unstable and prone to frequent massive flares, etc. He notes that no more than two percent of the stars in the galaxy would have even the basic characteristics conducive to the development of complex life, and that 60 percent of those have one or more companions, which are problematic to the maintenance of a stable planetary orbit. Speaking of which, there's also the fact that Earth's orbit is remarkably circular, and our tilt very stable (due to our large moon) providing us with fairly constant heat and energy from our special star.

Gribbin's analysis is so interesting that it has led me to find other special elements of our place in the universe, such as the relative quietude of the Milky Way's black hole, which is also tiny compared to those in most other spiral galaxies.

Perhaps the most disturbing for those who want to find intelligent life elsewhere are the extinction events (both climatological and cosmic) that are much less frequent on Earth because of the (tenuous) stability of our solar system, which is exhaustively questioned by Gribbin. Theoretical models of our planetary system often result in small planets plunging into the central star. The fact—as he mentions—that our species was once reduced to a small band of about 1,000 souls, grubbing for clams and crustaceans on the shores of South Africa, should not be forgotten.

I heartily recommend *Alone in the Universe* if only because of the immense amount of information and understanding that Gribbin's tireless investigation provides. Whether or not one agrees with his premise and conclusion, which is that we had "better get used" to the idea that we are alone, I am left with the profound understanding of how precious our life on Earth is, and what an astounding miracle it is that we are here at all. ★

DAS Annual Spring Banquet and Installation of Officers

at the Columbine Unitarian Universalist Church (CUUC)

March 23, 2013 at 6:00 P.M.

Catered Mexican Dinner.

Cost: $20 per person; members and significant others only.

Seating is limited to 70, so get your reservations in ASAP. The reservation form may be found at: *www.denverastro.org/banquet.html*, and will feature a new reservation system, courtesy of our talented IT guy Scott Leach. Due to space considerations, **we can't accept walk-ins without a reservation.** Those who use PayPal can pay directly on the reservation system; otherwise, there is a printable version of the form (See Back page) to send in with your payment.

Watch the March *Observer*,denverastro yahoogroup and Constant Contact messages for further information.

See Banquet Form on the Back Page!!

Speaker: William Bottke

Director, Dept. of Space Studies, Director, NASA/NLSI Center for Lunar Origin and Evolution (CLOE), Southwest Research Institute

Talk: *Planet Formation: What's New with the Oldest Events in the Solar System?*

Science @ NASA

RECORD SETTING ASTEROID FLYBY

by Dr. Tony Phillips

Reprinted from: http://science.nasa.gov/science-news/science-at-nasa/2013/28jan_2012da/

Jan. 28, 2013: Talk about a close shave. On Feb. 15th an asteroid about half the size of a football field will fly past Earth only 17,200 miles above our planet's surface. There's no danger of a collision, but the space rock, designated 2012 DA14, has NASA's attention.

"This is a record-setting close approach," says Don Yeomans of NASA's Near Earth Object Program at JPL. "Since regular sky surveys began in the 1990s, we've never seen an object this big get so close to Earth."

Earth's neighborhood is littered with asteroids of all shapes and sizes, ranging from fragments smaller than beach balls to mountainous rocks many kilometers wide. Many of these objects hail from the asteroid belt, while others may be corpses of long-dead, burnt out comets. NASA's Near-Earth Object Program helps find and keep track of them, especially the ones that come close to our planet.

2012 DA14 is a fairly typical near-Earth asteroid. It measures some 50 meters wide, neither very large nor very small, and is probably made of stone, as opposed to metal or ice. Yeomans estimates that an asteroid like 2012 DA14 flies past Earth, on average, every 40 years, yet actually strikes our planet only every 1200 years or so.

The impact of a 50-meter asteroid is not cataclysmic--unless you happen to be underneath it. Yeomans points out that a similar-sized object formed the mile wide Meteor Crater in Arizona when it struck about 50,000 years ago. "That asteroid was made of iron," he says, "which made it an especially potent impactor." Also, in 1908, something about the size of 2012 DA14 exploded in the atmosphere above Siberia, leveling hundreds of square miles of forest. Researchers are still studying the "Tunguska Event" for clues to the impacting object.

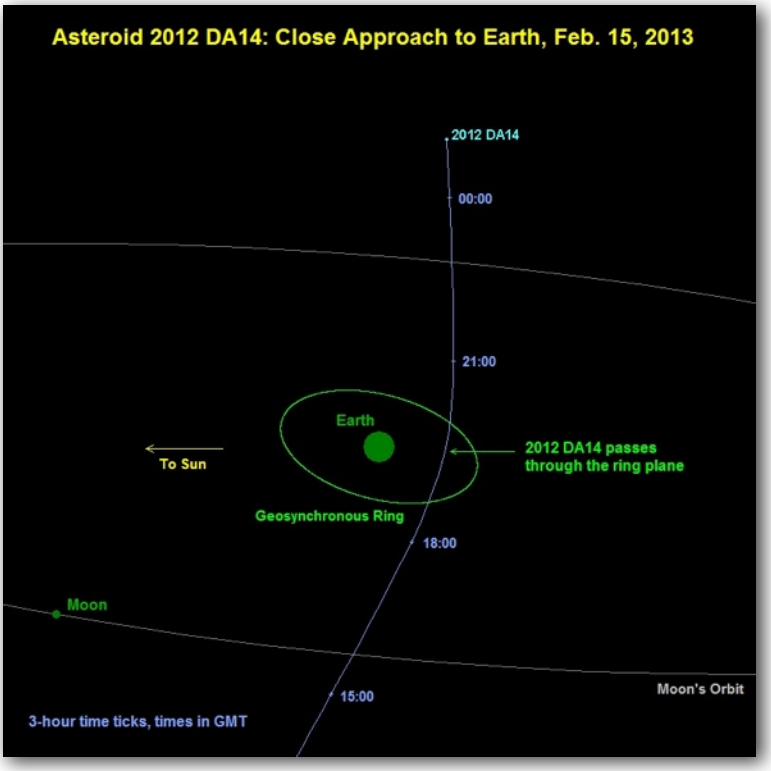
"2012 DA14 will definitely not hit Earth," emphasizes Yeomans. "The orbit of the asteroid is known well enough to rule out an impact."

A schematic diagram of the Feb 15th flyby. More

Even so, it will come interestingly close. NASA radars will be monitoring the space rock as it approaches Earth closer than many man-made satellites. Yeomans says the asteroid will thread the gap between low-Earth orbit, where the ISS and many Earth observation satellites are located, and the higher belt of geosynchronous satellites, which provide weather data and telecommunications.

"The odds of an impact with a satellite are extremely remote," he says. Almost nothing orbits where DA14 will pass the Earth.

NASA's Goldstone radar in the Mojave Desert is scheduled to ping 2012 DA14 almost every day from Feb. 16th through 20th. The echoes will not only pinpoint the orbit of the asteroid, allowing researchers to better predict future encounters, but also reveal physical characteristics such as size, spin, and reflectivity. A key outcome of the observing campaign will be a 3D radar map showing the space rock from all sides.



NEAR-EARTH ASTEROID 2012 DA14 TO MISS EARTH ON FEBRUARY 15, 2013

Paul Chodas, Jon Giorgini & Don Yeomans
NASA/JPL Near-Earth Object Program Office
March 6, 2012

During the hours around closest approach, the asteroid will brighten until it resembles a star of 8th magnitude. Theoretically, that's an easy target for backyard telescopes. The problem, points out Yeomans, is speed. "The asteroid will be racing across the sky, moving almost a full degree (or twice the width of a full Moon) every minute. That's going to be hard to track." Only the most experienced amateur astronomers are likely to succeed.

Those who do might experience a tiny chill when they look at their images. That really was a close shave.

For more information about 2012 DA14 and other asteroids of interest, visit NASA's Near-Earth Object Program web site: *http://neo.jpl.nasa.gov.* ★

PRESIDENT'S CORNER

(CONTINUED FROM PAGE 2)

of the sky. Since Comet PanSTARRS will be in the western sky in mid-March, our dark sky site is not the best place to view from because you would be looking directly into the Denver light dome. You'll need to go west of the city, or very far east to escape the light pollution, not to mention our Front Range mountains on western horizons. For astrophotography of the comets, you don't need a high power telescope, you might need a good tripod and short focal length but fast f/ratio lenses that can quickly capture the faint light of the tail and not create a star trailed effect. Your smartphone camera might not work very well. Perhaps you'll need to learn what fast f/ratio lenses are and which might fit your camera—you might even dust off that old 35mm film camera of your dad's in your closet. You might want to use a telescope though to view details in the gas cloud or coma at the head of the comet or even details in the tails. A relatively low power eyepiece with wide field might be best for viewing and couple of filters might help bring out some details. By the time we have our Annual Banquet and change of DAS officers on March 23rd, Comet PanSTARRS will have come and we'll have seen its best show. In other words, time is short. Are you up off the couch yet, or still thinking about it? With all their potential and need for planning, keep in mind what comet discoverer, David Levy says about comets—"Comets are like cats; both have tails and both do exactly what they want." Here's a link to three articles about observing comets: *http://tech.groups.yahoo.com/group/denverastro/files/Comet%20Observing/*

Clear skies, good comet hunting and clear dark horizons. Keep looking up!★

RIDICULOUSLY TINY TELESCOPES, OR HOW I BEAT APERTURE FEVER (PART 1)

by F. Jack Eastman

Aperture Fever (AF) has been with us for quite a while. Think of William Herschel's (18th Century) 48-inch telescope, William Parsons (3rd Earl of Ross), 72-inch speculum (bronze alloy) mirror which was completed in 1845, and, of course George Ellery Hale. He engineered the funding for what is still the world's largest refractor—the 40-inch at Yerkes Observatory installed in 1897. Just as this monster was seeing first light, his family ponied up for a 60-inch, 1,900-pound disk of glass which became the world's largest silver-on-glass reflector—this at Mt. Wilson in 1908. Hale was already dreaming of a 100-inch reflector, which became a reality in 1917, also at Mt. Wilson. Next, a 300-inch. Hale was beginning to think of a design for a telescope three times larger than Mt. Wilson's, but, perhaps, got a taste of sanity, or took a couple of AF pills, and opted for mere 200-inches which landed at Palomar in 1948.

For us amateurs in the 1950s, AF stopped for the most part at 12.5-inches. The grinding kit, containing a glass blank, grinding tool, abrasives, pitch and all cost $48—the blank alone was $21. A 16-inch blank, alone, was something like $175. There were a few big ones—Claude Carpenter's 18-inch f/7 (now Ford Observatory near JPI's on Table Mountain, California) comes to mind, but the really big ones were rare.

Enter John Dobson in the 1960s, and all bets were off. John figured out how to make big telescopes on the cheap—one of his first was a portable 24-inch f/6. At "first light" the images were terrible, but John knew the trouble was his mirror cell. On the second night out—perfection. And so it was. The age of monster telescopes was born.

THE THREE RIDICOUSLY TINY NEWTONIAN TELESCOPES: JOE'S 23.4MM, THE BRASS 47.5MM AND THE 40MM.

Photo by Cathie Havens

At the newly established Astro Optical Division of Valor Electronics (the very early Celestron), we were marketing a 20-inch Schmidt Cassegrain (SCT) as a high-end amateur telescope (or for college observatories and the like). Tom Johnson, owner of Valor, decided a more reasonable line of smaller telescopes aimed at the amateur market, might be more marketable and could improve cash flow. Born was the "Table Top Ten," a 10-inch SCT along with a couple of others—4-inch and 6-inch models.

The primary mirror for the 10-inch was very thick in the center, and tapered off to about a centimeter near the edge. The front was cast with the proper radius of curvature (one meter) with a deep dimple in the center about 45mm or so in diameter. The drill (pun intended) was first to core-drill out the glass at the bottom of the dimple, and cement the resulting slug back in at the front surface in order to provide a continuous surface for the subsequent grinding and polishing. When the mirror was done, that plug was removed and the mirror sent off to the coating lab. This is where my harebrained idea came in. "Tom, let's send a couple of these mirrors in for coating, but leave that plug in place." He replied, "No, I don't think they'll take 'em, outgassing problems or whatever." "Oh well, let's do it anyway." The mirrors came back, beautifully coated, plugs and all. Now remove the plug, which of course, is a concave mirror sharing the curve of the 10-inch, albeit a small one (42mm in diameter in this case). "I'm gonna make a telescope outta this thing," I thought. So, my mighty 0.04-meter Newtonian was born. (FIG. 1). The tube is a piece of aluminum (42mm inside diameter 1.5mm wall) with a short piece with a much thicker wall, 5.1mm, pressed on the end. I machined the end of this to ensure it was perpendicular to the main tube's axis and was smooth. Three #2/56 holes were drilled and tapped to fasten the plate containing the mirror. This is a disk of aluminum about 3mm thick, the mirror, 14.5mm thick, double-sided taped to it. Three through holes for attaching the plate and 3 #2/56 tapped holes for the adjusting screws. This is basically the way a refractor cell is made, and this thing holds collimation beautifully. Now for the real fun—a diagonal and an eyepiece holder. I had a small (8.5mm) 45-90-45 prism, which I thought should work nicely. It was taped to a short square piece of aluminum cut off and machined to 45 degrees. A #2/56 was drilled in the opposite end so it could be fastened to the spider, still allowing for rotation to aim it at the eyepiece. The spider hub was a short piece, drilled and

FIG. 1: THE 40MM PIPE MOUNTED NEWTONIAN, 4X10 FINDER

Photo by Cathie Havens

tapped (#2/56) in four places, 90 degrees apart. Four holes were also drilled in the "upper" end of the tube and the spider hub fastened with long #2 screws (diameter 2mm, length 16mm). Not the best for spider vanes, but it worked! The last thing was the eyepiece holder, fashioned from a small plate, bent to match the tube and a short 0.965-inch tube fastened to the plate. Done!

The mount is the traditional pre-Dobson "Plumber's Nightmare" fashioned from 1/2- and 3/4-inch pipe fittings, two tees, a couple of short nipples and a couple of longer pieces for the shafts. It was crudely cobbled together by a neighbor and telescope maker—he didn't machine the shafts, but just poured babbitt metal, and then brute-forced the thing to move somewhat smoothly. I inherited this thing, and it was ideal for this tiny telescope. I smoothed the shafts somewhat, added a 60-tooth worm gear to the polar axis and fashioned a tangent-arm slow-motion to the declination axis. Lastly, I added a four-inch declination circle and a small R.A. circle, made by "creative xerography" reducing a circle on the copy machine until it was the right size.

I tried several peep sights, and finally made a 10mm aperture 4X finder. It worked very well, now I could find stuff other than the moon and, maybe, Jupiter!

This telescope performs beautifully, far exceeding my expectations. The mirror is essentially a perfect sphere, being a small section from the much larger essentially perfect surface. Yes! It should be a paraboloid, this guy will suffer from spherical aberration. How bad is it? The smallness and long focal length (f=500mm, f/12.5) reduces the problem to

NOMINATIONS AND ELECTIONS

The nominations for 2013 DAS Officers are:
President - Ron Hranac
Vice President - Lisa Judd
Secretary - Dennis Cochran
Treasurer - Brad Gilman
Executive Board:

Jack Eastman	Scott Leach
Chuck Habenicht	Russel Quan
David Shouldice	Dina McClung
Dan Wray	Digby Kirby
Neil Pearson	John Barela
Joe Gafford	Ed Scholes

Nominations will remain open until the elections at the Annual meeting on February 22. New officers will be installed at the Annual Banquet on March 23.

almost zero. Calculating the minimum error on the wavefront shows a spherical aberration of the order of 0.0175 waves. That should be better than good enough!

It is interesting to note, that during a Chamberlin starparty (the ancestor to what we now call "Open House"), one of our younger members playing with this telescope bagged some dozen Messier objects! Of course the skies at Chamberlin were much better back then.

One night I was looking at Epsilon Lyrae, the famous "Double-Double." I certainly didn't expect to detect anything. There seemed to be a bit of astigmatism in the eyepiece (a 10mm Kellner). The weird thing about it was the axis of the astigmatism was one direction on one side of the field, right angles to it on the other. Huh? Short story, I checked with a bigger telescope. Sure enough I was detecting the duplicity of the stars! Their separations were both at 2.3 seconds (2011 measurement, Washington double star catalog [WDS]). This is just a tad under Dawes limit—2.86 arc-seconds—for a 40mm aperture!

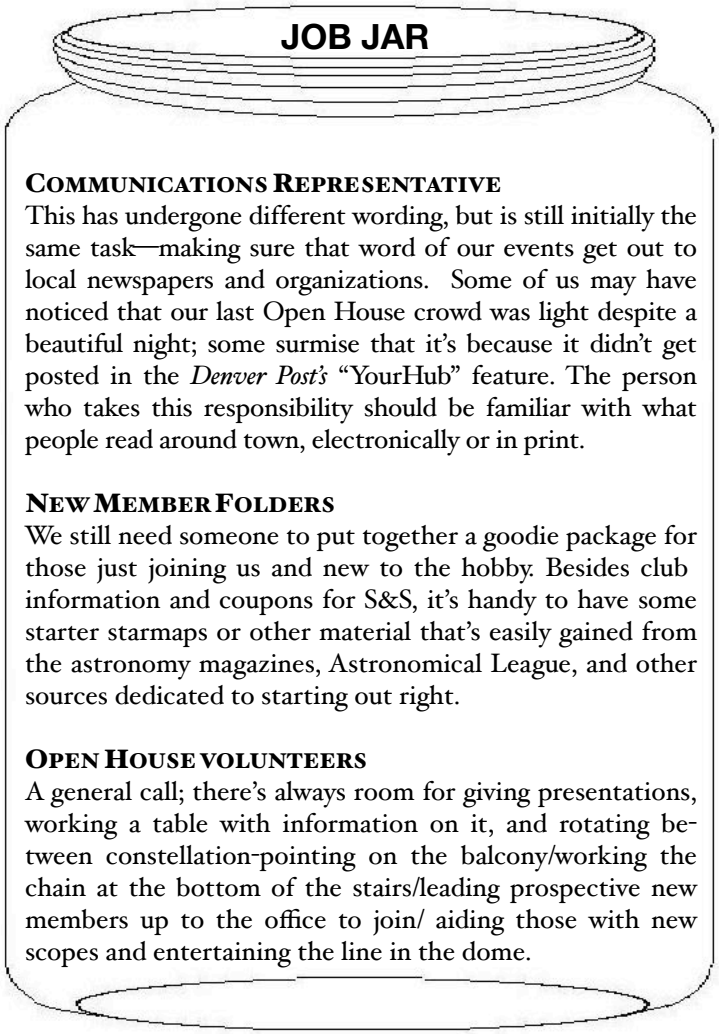
THE TINY 23.4MM, LABEL "CELESTRON .8"
Photo by Cathie Havens

A funny story—while at Griffith Observatory one night I was telling of seeing the polar cap and, most likely Syrtis Major, on Mars with the 40mm. I was told by a couple of folks there, that that most likely wasn't possible. I said, "I've got the evening planetarium show here. Take it out and see for yourself." The telescope was equipped with a 4mm eyepiece, ridiculously high power, over 3X/mm. After the show the guys assured me that they couldn't see anything on Mars at all. I said, "Let's go try again," as I was sure I had seen this before. I set the telescope on the rail outside the planetarium and aimed it at Mars. The others looked at where I was pointing, then looked back over their shoulders, "What are you looking at?" they asked. "Mars," I replied. That explained it. They had mistaken Arcturus for Mars, and at the extreme power they were examining the Airy diffraction disk of the star. Although about the right color, no polar cap or markings on the diffraction pattern! Yes, we all saw the cap and Syrtis after all.

The success of this little telescope inspired another idea for me. Celestron was also producing a 6-inch f/8 SCT as a long (f=1200mm) photographic lens. The 8.7mm thick center plug from this was about 48.3mm in diameter. It allowed for a 47.5mm aperture if used for a small primary mirror (larger than the 40mm, is AF creeping in here?). The focal length of this one was 376.2mm, f/7.9 The smaller f/# (and larger size) meant more spherical aberration, but for this one it was still a small 0.084 waves. Still, very good. Good enough! *(This article will be continued in next month's* Observer*).* ★

DAS JOB JAR

We've had some good volunteers for our various Open House needs as defined last month; Digby Kirby has volunteered to help on the main floor, and newcomer Jeff Kieft will be operating our Ready Mount for handicapped access. There's always room for more, so if you'd like to help out in the dome or main floor with crowd control or out on the lawn helping people get to know their new scopes, don't hesitate to put your hand up. In the meantime, we still have some older needs that no one's volunteered for yet, so please consider helping your club.



COMMUNICATIONS REPRESENTATIVE
This has undergone different wording, but is still initially the same task—making sure that word of our events get out to local newspapers and organizations. Some of us may have noticed that our last Open House crowd was light despite a beautiful night; some surmise that it's because it didn't get posted in the *Denver Post's* "YourHub" feature. The person who takes this responsibility should be familiar with what people read around town, electronically or in print.

NEW MEMBER FOLDERS
We still need someone to put together a goodie package for those just joining us and new to the hobby. Besides club information and coupons for S&S, it's handy to have some starter starmaps or other material that's easily gained from the astronomy magazines, Astronomical League, and other sources dedicated to starting out right.

OPEN HOUSE VOLUNTEERS
A general call; there's always room for giving presentations, working a table with information on it, and rotating between constellation-pointing on the balcony/working the chain at the bottom of the stairs/leading prospective new members up to the office to join/ aiding those with new scopes and entertaining the line in the dome.

DAS 2013 Spring Banquet Invitation
Election and Installation of Officers, and Recognition of Volunteers

You are cordially invited to the Denver Astronomical Society's Annual Banquet on Saturday, March 23rd from 6 to 9 P.M. at Columbine Unitarian-Universalist Church, 6724 S. Webster St., Littleton. Due to space considerations, seating is limited to 70, so **get your reservations in ASAP.** An online reservation form may be found at *www.denverastro.org/banquet.html.* Those who use PayPal can pay directly on the reservation system; otherwise, the form can also be printed to send in with your payment. This year's banquet will feature a Deluxe Mexican Taco Buffet catered by Taco Mojo Mexican Catering in Littleton. Cost per person is $20.00 and includes beer, wine, juices and soft drinks.

Please indicate the number of people in your party on the form below. Clip off the form for mailing so you will have this sheet for reference. Please include a check payable to the "Denver Astronomical Society" or "DAS" and **mail the form and check to Brad Gilman at:**
Brad Gilman, DAS Treasurer, ATTN: Spring Banquet, 7003 S. Cherry St, Centennial, CO 80122-1179.

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(cut here and keep top portion)

Name:______________________________

Phone:______________________________

Email:______________________________

Deluxe Taco Mojo bar includes:
Shredded Beef Barbacoa,
Grilled Citrus Chicken,
Grilled Vegetables and Grilled Corn
& Tomato Salad.

Total # Meals: ____ X $20 = $ ____ GRAND TOTAL = $ _______

FEBRUARY SPEAKER: Bill Tschumy: An Inside Look at *SkySafari*

SkySafari is Southern Stars' award winning planetarium program that runs on iPhones, iPads, Macintoshes and Android devices. It allows you to simulate the night sky at any location on Earth at any time or date. Bill is one of the authors of *SkySafari* and will talk about its history, its development and its use. Learn what's involved in making a large application for mobile devices like the iPhone. See it in action and learn what future directions it will take.

Bill will also be talking about the CubeSat satellite the Southern Stars will be launching later this year. The satellite, called SkyCube, will have a mission of public education and outreach. It will be able to snap pictures from space which are downloaded to your computer or mobile device and can send and receive "tweets from space."

The Denver Astronomical Society
c/o Chamberlin Observatory
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Denver, Colorado 80210