

March 1993

ST-4 CCD images of NGC1365 (200 seconds, 17.5" f/4.5 with 1/2 focal reducer) and the Leo Cluster around NGC3190 (360 seconds, 6" f/5 with focal reducer) taken by Roger Tanner and Brian Close at the 1993 Winter Star Party. Image processing by R. Tanner and K. Hillig.

Kurt Hillig
Editor

Of the University Lowbrow Astronomers

The University Lowbrow Astronomers is a club of astronomy enthusiasts which meets on the third Friday of each month in the University of Michigan's Detroit Observatory at the corner of Observatory and Ann Streets in Ann Arbor. Meetings begin at 7:30 PM and are open to the public. Public star parties are also held twice monthly, at the Peach Mountain Observatory on North Territorial Road (1.1 miles west of Dexter-Pinkney Road; map on page 7) on the Saturdays before and after the new moon (cancelled if it's cloudy at sunset). For more information, call Stuart Cohen at 665-0131.

This Month:

March 19 - Meeting at the Detroit Observatory in Ann Arbor. The truth about Geminga: Now it can be told! Dr. Richard Teske of UM's Astronomy Department will discuss "The Rise and Fall of a Naked Neutron Star." X-rayed!

March 20 - Public Open House at the Peach Mountain Observatory. Three days before the new moon, so it should be nice and dark for galaxy hunting. Will the weather cooperate? Raindrops keep falling on my head....

March 27 - Public Open House at the Peach Mountain Observatory. Jupiter is close to opposition, and it's been looking mighty good - Mars is still hanging in there too.

Stranger than Truth? Cheaper than Truth!

Our consumer advocate has a tip this month for those of you with 1.25" friction-fit focusers who are too cheap to buy a good one with a locking screw: steal a radiator hose clamp from a Honda! It's a spring-type clamp which is just the right size to slip over the focusing tube to lock your favorite Tasco 4mm eyepiece in place, and it leaves just enough clearance that you can swap optics without needing Vise-Grips™ or a hydraulic jack. Of course you'd better not plan any long trips - unless you steal it from someone else's car....

Remember - this column is for YOU to write - we want the wierdest, most outrageous, cheapest or just plain stupidest thing you've run across. Call Kurt at 663-8699 with your discoveries!

Next Month and Beyond:

April 1 - Computer Subgroup Meeting at Kurt Hillig's house (a Thursday). More work on the project to computerize the 24" scope, a demo of Voyager II (a Macintosh-based star-chart program), info on CCD cameras, and lots of other fun. Call Kurt at 663-8699 for directions.

April 16 - Meeting at the Detroit Observatory. Elections! Come out and show us how a democracy really works.

April 17 - Public Open House at the Peach Mountain Observatory. The Moon is in the Seventh House, and Jupiter's aligned with Mars. Sorry, just kidding - besides, I used this line last month (April fool!)....

April 24 - Public Open House at Peach Mountain. We guarantee, if it's in the sky we can see it!

May 1 - Computer Subgroup Meeting (location T.B.A.)

Oops!

The article "It's Real!" in last month's issue of *Reflections* was written by Bill Razgunas, not by John Raz. Let this be a warning: never trust the memory of an editor, always put your name somewhere in the articles you write!

The 1993 Texas Star Party will be held this year from May 16 through 22 (Sunday through Saturday) at the Prude Ranch in southwest Texas. The TSP registrar is Bobby Brailey P.O. Box 386 Wylie, TX 75098

The 1993 Winter Star Party, or CCD Madness in the Keys

by Roger Tanner

In spite of a hectic work schedule, Brian Close and I managed to attend the 1993 Winter Star Party, from February 15 to 21 this year. The WSP is hosted by the Southern Cross Astronomical Society, and is held at a Girl Scout camp on an island between Bahia Honda Key and Big Pine Key. The registration had reached their limit of 480 people early in December - so you should start making plans now if you want to go next year. The weather was very good, with three clear nights and two half-clear ones. The temperature was a balmy 70's during the day and 55 to 65 at night - a welcome change from the Michigan weather. The skies there are fairly dark - darker than Peach Mountain, though not as dark as at the Texas Star Party. However, the seeing was very good and a lot of detail was visible on Jupiter and Mars. The other nice thing about this site is that it is at 24.5° N latitude with a clear southern horizon (the ocean), which means you can see objects down to -60° in declination such as Eta Carina.

There were 4 or 5 lectures every day, with the usual excellent talks by Richard Berry (on CCD imaging and image processing), Jack Newton (on deep-sky CCD imaging) and Don Parker (on planetary CCD imaging). There was an interesting discussion, given by Dr. Florentin Maurrasse, of the evidence supporting the theory that a large comet impact in the Yucatan caused the KT-boundary extinction 65 million years ago. Walter Scott Houston gave a talk on Southern Deep Sky wonders for us northern folk. There was a telephone conference with Dave Levy, and Eugene and Carolyn Shoemaker at the Palomar Schmidt camera while they were taking plates. Tony Hallas gave a talk about a typical night of astrophotography, covering the equipment he uses and some of his techniques. He showed some fabulous slides of his deep sky photographs, but finished with the comment that he is getting into CCD imaging.

Stephen James O'Meara gave an excellent talk on planetary observing at the Pic du Midi Observatory. Stephen related how he and a French planetary observer put together and got approval for a visual planetary observing program. The idea was to see if they could see with their 1 meter scope the detail on Mars reported by some of the famous observer of the past. They looked at Mars when it was only 5 arc seconds across - the best seeing they had was about 1/2 arc second - but though they saw plenty of detail they didn't see the volcanoes reported by past observers. They both independently sketched what they saw and afterward compared sketches. They easily detected spokes on the rings of Saturn and clouds on the planet. They also detected Charon as a lump on the side of Pluto! Stephen's talk was very enlightening as he related how accessible Pic du Midi is for amateur observing. You need to sign up in advance and the charge is about \$30 a day - but that includes meals, a room, and use of the 0.4 meter scope! I think I know what I'm going to do if I ever get the chance to go to France...

The usual collection of interesting scopes was there for us to look at and through. The biggest scope was the "Yard" scope brought by Tom Clark of Tectron. If you think this means that it is a 36" scope, you are right! The scope is an f/5 and comes with the tallest step ladder I have ever seen to get to the eyepiece. The whole scope only weighed 360 lbs, which is pretty amazing considering the mirror weighs 200 lbs by itself. Brian Close got to look at Omega Centauri through it and said it was striking. A Georgia club had an interesting 17.5" Dobson with six truss tubes attached to the Novak mirror cell at one end and plywood disc which held the spider at the other end. The focusing mount was welded into one of the truss tubes - talk about a minimalist scope! There were lots of 20 to 25 inch Dobs, and a few equatorially mounted on home made mounts. There was several refractors including a 8" EDF Starfire Astrograph (which lists for about \$24K with the mount - I just had to ask). This scope has a huge 4" diameter focusing mount and can put a 4 inch diameter diffraction limited field on 4 x 5 film!

We got a lot of traffic in my trailer because some people had discs of images they wanted to show Richard Berry and Don Parker, and I had the only big computer on site. Jack Newton also wanted to process some images he'd taken the night before with his ST-6 CCD camera to combine the images into a tricolor image. Along the way he gave us a quick lesson on using Photostyler to combine and register images and how to boost their color saturation. He also showed us how to make oblong star images (caused by the wind moving the scope around during the exposure) circular with the "smudge" tool! With a photo retouching program like Photostyler there isn't anything you can't do - which also means that you can't always believe the pictures! In exchange for the use of the computer, Jack gave us some copies of his latest images.

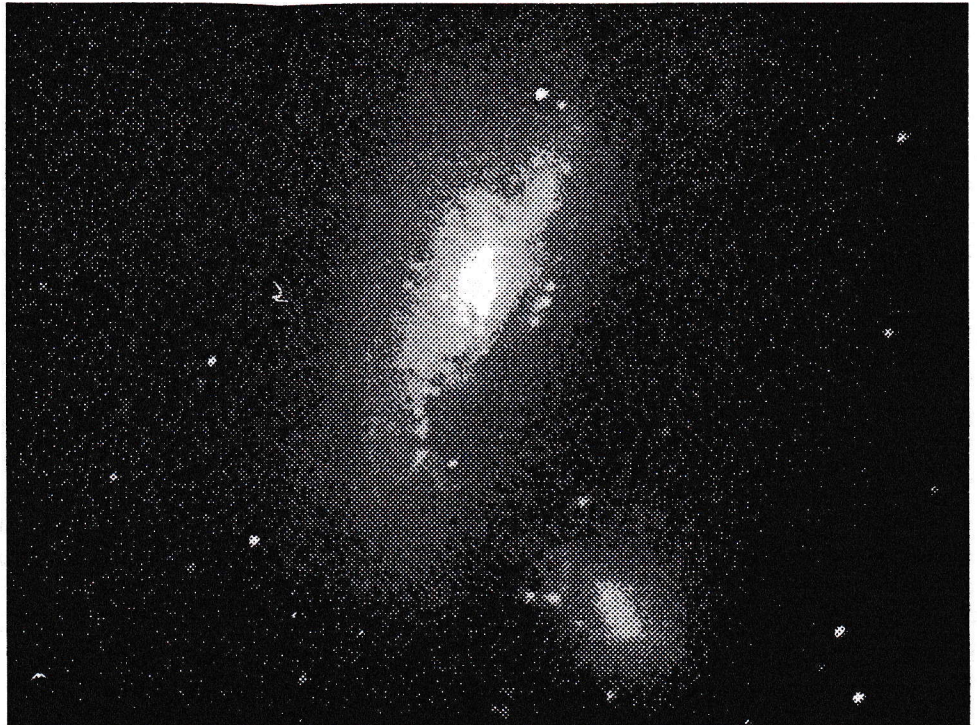
A couple of Georgia amateurs named Jerry Armstrong and Tim Puckett have been doing CCD imaging of comets and planets with Cyrocam 80 and Lynxx PC cameras on a 16" f/6 Newtonian. Jerry also needed a computer to show the images on and he used my PC to display them with AstrolP and Photostyler. Several nights later Richard Berry, Don Parker and Jeff Bish (recorder for the Mars patrol) stopped by to look at the images with Jerry, and they were very impressed. Jerry and Tim have over 300 images of comet Swift-Tuttle, and have animated them on a video tape. The comet looks like a pinwheel, you can see the jets spiraling as it rotates. Jerry is a long time comet observer and Swift-Tuttle is the 220th he has studied. Jerry also gave me some images to use.

After Don Parker left, we talked Richard into giving us a some image processing pointers on how to improve some of the images we had just taken. (We didn't have to twist his arm too hard, he is always interested in looking at what people are doing.) An hour and a half later we had gone through several functions in AstrolP which Brian and I now understand much better, and seen some slick things like

An image of NGC4490, taken by Jack Newton at the Winter Star Party, February 1993.

Taken with an ST-6 CCD camera on a 25" f/5 telescope, this is a composite gray-scale image made from the original tricolor picture. Exposure times through each of the three color filters were typically ten minutes. Image processing was done with the *Photostyler* program on a DOS/Windows 486 computer.

[Further processing was done with *Pagemaker* on a Macintosh IIcx to prepare this for printing in *Reflections*. It really looks better in the original, but I haven't figured out all the tricks of this yet! - Ed.]



the "clone tool" in Photostyler. We also pumped Richard for information about the replacement for AstroIP which will be out Real Soon Now, and the CCD camera kit he is writing the assembly instructions for. The kit will require average electronic skills and has computer assisted check out of the circuitry every step of the way. The resulting camera will come in two versions - one with the TC211 chip, which will have equivalent performance to the Lynxx PC for about \$300 including a shutter and a 12 bit A-D converter, or the same kit can be built with a bigger CCD chip to give performance equal to the ST-6 for \$100 more. These kits are scheduled to be out in about 6 months.

Brian and I had an outstanding time doing observing and lots of CCD imaging. We spent some time looking at Mars and Jupiter. They show more detail down there than anywhere else I have seen them from. We probably didn't see all the things we could have in the deep sky area though, because we spent too much time looking at the monitor during the imaging sessions and never had time to get well dark adapted.

I think Brian got hooked on CCD imaging. He remarked that this technique was coming along just in time to allow him to pass over the photography part of astronomy. We had several nights of imaging, selecting some deep sky objects along the southern sky that we couldn't see from home. We imaged a galaxy cluster around NGC3190 with the 6" scope and a focal reducer. The next night we imaged the barred spiral NGC1365 in Fornax - which appeared as a bright nucleus with some fuzz around it to the eye - with my 17". Using the CCD we got a clear image of the bar and the arms. We also got a good image of NGC2261 (Hubble's Variable Nebula in Monoceros). Brian introduced me to this nebula, and it's a sneaky one - it looks just like a comet!

We also got an image of part of NGC2359 - the Duck Nebula in Canis Major, another new one for me. In fact we got both an ST-4 image and an ST-6 tricolor image! As we were setting up the scope that night, Jack Newton stopped by to see what we were doing, and casually mentioned that he had his ST-6 with the SBIG color interference filter wheel with him. He planned to take some images with another person at the star party, but the computer had not shown up yet. We talked him into setting the camera up on my 17" and doing a tricolor image of the Duck nebula. The image came out great, except some light leaked from the pilot light on the 12V supply Jack used to power the fan on the ST-6. The light was blue green and leaked into the corner of the blue image. I have been busy smudging and cloning it out in Photostyler. I got to see what it was like to use a high resolution camera and compare images with the ST-4. One thing that is apparent is the ST-6 chip has scattered bright (hot) pixels in the thermal noise map the which can cause noise in the final image - like salt scattered across the field. The thermal noise map in the ST-4 is much more even.

We also got some good images of NGC3115 - the Spindle Galaxy in Sextans. We took three shorter exposures and averaged them together to keep the nucleus from saturating. This reduced the noise by almost factor of 2 as well, giving a nice clean image. We also got an interesting image of NGC4038 and 4039 - the "Rat Tail" or "Antenna" galaxies in Corvus - which were on page 1 of the July '92 *Reflections*, and grace the back cover of this issue. We only got the two interacting galaxies and not the tails because of the narrow field of view of the chip.

All in all, it was a very interesting and educational star party. This has really got me fired up to build a better camera and work on my imaging techniques.

New Eyepieces and Accessories for the McMath 24" Telescope!

As most of the Lowbrows know, the McMath telescope was originally designed for a specific task – solar observation. This design doesn't always lend itself well to the wider variety of uses we put it to. Since the Sun is fairly bright, and McMath et. al. were interested in fine detail of the solar surface, the scope has a very high f-ratio – about $f/25$ – giving a focal length of about 15,250 mm. (That's 50 feet – about the same as the 200" Hale telescope at Mt. Palomar!) This gives it lots of magnification – about 275x with the 55mm Plössl eyepiece which was our standard – but fairly faint views of extended objects, and a field of view of only ten arc minutes. And the eye relief on that Plössl plus its small exit pupil make it difficult for visitors – especially the younger ones – to keep their eye in the right place.

To overcome some of these problems, Mark Cray of the Lowbrows has made three new eyepieces for the big scope. All three are based on the Erfle design, since that's fairly easy to make and works fine at $f/25$ (see figure). One is a giant – an 80mm diameter, 120mm focal length monster that weighs several pounds (and required its own special mount) – and the other two are 70mm and 75mm FL eyepieces which fit in the 2" mount. These are all brass and stainless steel, with "off-the-shelf" lenses (thanks to Jan Seyfried at University Optics for help with these), and they're real nice pieces of machine work!

The new monster eyepiece is almost 4 inches in diameter. Why so large? Because a two-inch diameter eyepiece simply can't give a field of view wider than $1/5$ of a degree in a scope with such a long focal length. The new 120mm Erfle uses the McMath scope's baffle tube as a field stop, giving the widest field possible – in this case, 20 arc minutes, a third of a degree. Its apparent field of about 42° , and exit pupil of 5mm make it easy to keep your eye positioned, and the eye relief is long enough even for those with thick glasses (or very low brows).

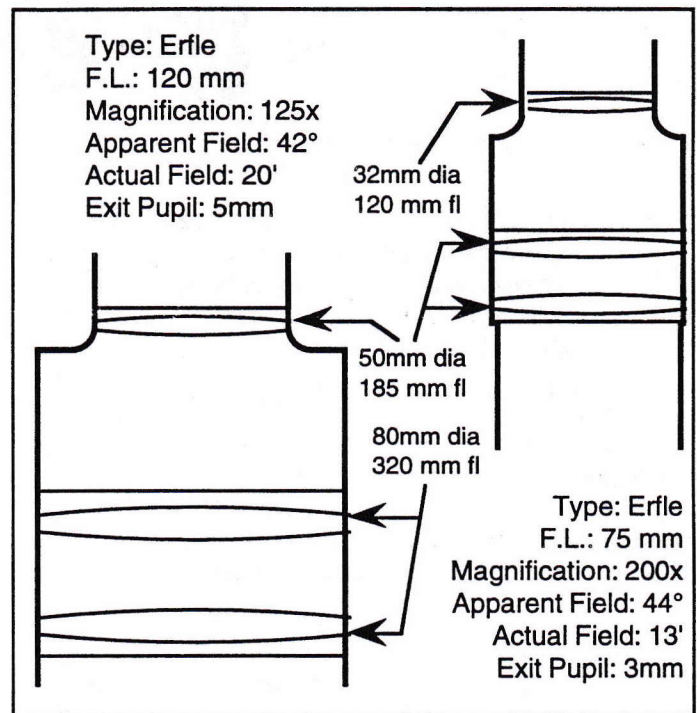
The two smaller lenses might be less imposing, but they're no slouches either. With magnification around 200x they're dandy for looking at Jupiter – but I'm sure you'll find

your own favorite use for them. Specs: apparent field – 44° ; actual field – $13'$; exit pupil – 3mm; eye relief – Mark doesn't say, but my glasses don't interfere....

Check these puppies out! Several of us have been up to Peach Mountain in the past couple months, and all have been very impressed by the views through the 120 mm. Try it on M42 (if we get a clear night before it's too low in the sky) or a bright globular, or even on the Moon. It still gives plenty of magnification – about 125x – and you'll be seeing purple spots for a while after looking at Luna, but what a view!

Not satisfied with just these, Mark's also made various adapters for different size eyepieces, and has also put together a sweet little 80mm finder scope (ca. $f/4$? I don't have the specs handy) soon to be mounted on the 24". Sez Mark: "I hope that these new accessories will make locating and viewing the more difficult celestial objects an easier and less time consuming task." Sez me: Let's nominate him for 'Accessory Maker Plenipotentiary'!

– Kurt Hillig



Call for Volunteers!

The South Elementary School in Chelsea, MI has requested the aid of the Lowbrows in putting on a star party for their fourth grade students and their families – about 30 families, perhaps 100 people altogether.

They would like to hold this at the end of April – their preferred date is the 24th (an open house night), but if we can't get enough volunteers we can try for an evening during the following week. Rather than counting on clear skies or juggling the schedule, they would like a "Plan B" talk / slide show if the weather is bad that day.

Here's a great opportunity for some education and publicity – or just to get small fingerprints on your lenses, if you prefer. All we need is willing helpers with their scopes.

Call Doug Nelle at 996-8784 for more information, or come to the club meeting on March 19.

An Exercise in Humility

The story is told that when Franklin D. Roosevelt was President of the United States, he used to have a little ritual with the naturalist William Beebe. After dinner together, the two men would go outside and look up into the night sky. They would find the lower left hand corner of the great square of Pegasus.

One of them would recite the words: "That is the spiral galaxy of Andromeda. It is as large as the Milky Way. It is one of a hundred million galaxies. It is 750,000 light years away. It consists of a hundred billion suns, each one larger than our own sun."

They would then pause a few minutes, and Roosevelt would finally say "Now I feel small enough. Let's go to bed."

Computer Subgroup Report

by Ano Neemous

The Computer Subgroup met at the home of Tom Ryan on March 1, 1993. The members only slightly outnumbered the computers: Roger Tanner brought his 486 system from home and Steve Musko brought the old IBM XT which has been donated to the club for the digital McMath project, and Tom's machine stayed in his basement (though we subjected it to a fair bit of abuse after the meeting ended); I had an HP15C calculator in my pocket, too, but that doesn't count for much these days.

The meeting began with yet another extended discussion of the project to add digital setting circles to the McMath telescope. The main topic: assignment of duties. Roger was volunteered to work on the "real" hardware—i.e. a cabinet in which to mount the computer and monitor. Steve Musko is the senior software engineer for the project, plus the principal investigator for technology (i.e. the interface between the encoders and the computer). Tom Ryan will be facing the arduous task of turning schematics into working boards, while the rest of the computer group will be providing moral support and unneeded (and usually conflicting) advice.

Two consensus opinions were reached: 1) that we're better off building a simple system that works now, rather than spending years designing a perfect system which we never get around to building, and 2) we don't know enough about control systems for it to be practical or safe to have a computer-controlled telescope—the risk of injuring someone or of damaging the scope is too high. On the other hand, using our combined experience (as it accumulates) to help automate our personal scopes doesn't have quite the liability problems, so I expect this will be a continuing subject of discussion at future meetings.

After this extended wrangling, we were all happy to turn our thoughts and eyes (but not our mouths - they were too busy with the M&M's etc.) to more lofty matters – the contemplation of the heavens, as expounded by Roger. As most of you have realized by now, he has recently returned from a week at the Winter Star Party in Florida (if you don't, go back to page 2 and start over!). While the pictures elsewhere in this issue illustrate some of the things he showed us, the main discussion focussed on image processing and CCD cameras in astrophotography.

I'm not going to go into detail on the art and science of image processing – I'm hoping to get Roger to write an article on it for *Reflections* – but CCD imaging is starting to be pretty popular among amateurs. It's got some advantages over film, including higher sensitivity, no reciprocity failure, and the ability to combine multiple images to enhance faint objects. Of course it's got drawbacks too, like high startup cost, and a very small image size (Roger's CCD chip is only about 0.1" square, while a 35mm camera frame is about 1" x 1.4", and it takes a lot of disk space...

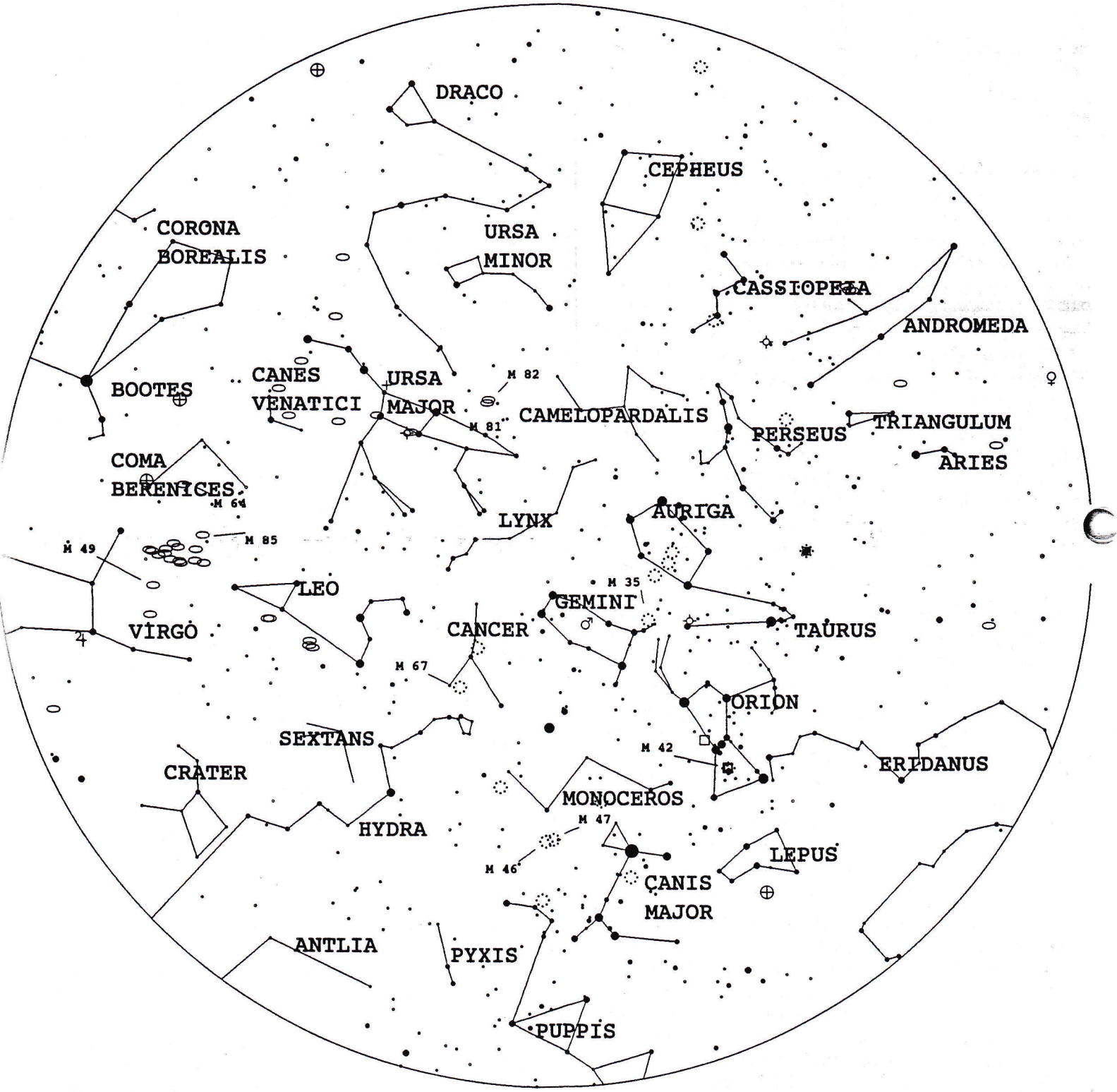
Next Month's meeting will be at Kurt Hillig's house (call 663-8699 for directions). On the agenda: Voyager II for the Mac, and some electronic movies from NASA.

Comet P/Schaumasse

Since many people have asked for the positions of periodic comet Schaumasse, I have downloaded the daily positions for it, and print a subset below. These are given in equinox 2000.0 coordinates and are for 0 hours UT (7PM EST on the previous day, if I did my calculation correctly).

YR	MN	DY	R. A.	DEC.	MAG
1993	3	10	5 47.552	+46 26.20	9.1
1993	3	11	5 52.891	+46 37.33	9.1
1993	3	12	5 58.317	+46 47.43	9.1
1993	3	13	6 3.825	+46 56.46	9.1
1993	3	14	6 9.410	+47 4.38	9.1
1993	3	15	6 15.068	+47 11.17	9.1
1993	3	16	6 20.793	+47 16.80	9.1
1993	3	17	6 26.579	+47 21.23	9.1
1993	3	18	6 32.421	+47 24.44	9.2
1993	3	19	6 38.311	+47 26.41	9.2
1993	3	20	6 44.244	+47 27.12	9.2
1993	3	21	6 50.212	+47 26.56	9.2
1993	3	22	6 56.208	+47 24.71	9.2
1993	3	23	7 2.225	+47 21.56	9.2
1993	3	24	7 8.256	+47 17.11	9.3
1993	3	25	7 14.293	+47 11.36	9.3
1993	3	26	7 20.330	+47 4.31	9.3
1993	3	27	7 26.358	+46 55.97	9.3
1993	3	28	7 32.372	+46 46.35	9.3
1993	3	29	7 38.363	+46 35.45	9.4
1993	3	30	7 44.326	+46 23.31	9.4
1993	3	31	7 50.254	+46 9.95	9.4
1993	4	1	7 56.140	+45 55.37	9.4
1993	4	2	8 1.980	+45 39.63	9.5
1993	4	3	8 7.767	+45 22.73	9.5
1993	4	4	8 13.497	+45 4.72	9.5
1993	4	5	8 19.165	+44 45.63	9.5
1993	4	6	8 24.767	+44 25.50	9.6
1993	4	7	8 30.299	+44 4.37	9.6
1993	4	8	8 35.757	+43 42.27	9.6
1993	4	9	8 41.140	+43 19.24	9.7
1993	4	10	8 46.445	+42 55.33	9.7
1993	4	11	8 51.670	+42 30.58	9.7
1993	4	12	8 56.813	+42 5.04	9.8
1993	4	13	9 1.873	+41 38.74	9.8
1993	4	14	9 6.850	+41 11.72	9.8
1993	4	15	9 11.743	+40 44.04	9.9
1993	4	16	9 16.552	+40 15.74	9.9
1993	4	17	9 21.276	+39 46.86	9.9
1993	4	18	9 25.917	+39 17.44	10.0
1993	4	19	9 30.474	+38 47.53	10.0
1993	4	20	9 34.949	+38 17.16	10.1
1993	4	21	9 39.341	+37 46.38	10.1
1993	4	22	9 43.654	+37 15.23	10.1
1993	4	23	9 47.886	+36 43.75	10.2
1993	4	24	9 52.041	+36 11.96	10.2
1993	4	25	9 56.118	+35 39.92	10.3
1993	4	26	10 0.120	+35 7.65	10.3
1993	4	27	10 4.048	+34 35.19	10.3
1993	4	28	10 7.904	+34 2.57	10.4
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1993	4	30	10 15.404	+32 56.98	10.5

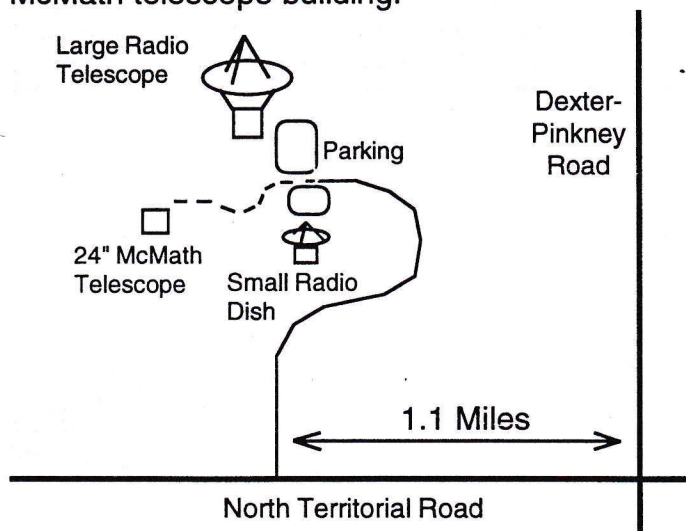
Star Chart for Peach Mountain
Saturday March 20, 1993
8:23 PM EST



☞ Places:

The Detroit Observatory is in Ann Arbor, at the corner of Observatory and Ann Streets, across from the old University of Michigan hospital and between the Alice Lloyd and Couzens dormitories. The Detroit Observatory is an historic building which houses a 19th century 12-inch refractor and a 6-inch transit telescope.

The Peach Mountain Observatory is the home of the University of Michigan's 20-meter radio telescope, and the McMath 24-inch telescope maintained and used by the Lowbrows. The observatory is located northwest of Dexter; the entrance is on North Territorial Road, 1.1 miles west of Dexter-Pinkney Road. A small maize and blue sign marks the gate. Follow the gravel road one mile to a parking area near the radio telescopes. Walk along the path southwest (between the two fenced-in areas) about 300 feet to reach the McMath telescope building.



☞ Times:

The monthly meetings are held on the third Friday of each month at 7:30 PM at the Detroit Observatory. During the summer months, and when weather permits, a club observing session at Peach Mountain will follow the meeting.

Public Open House / Star Parties are held on the Saturdays before and after each new moon at the Peach Mountain Observatory. Star Parties are cancelled if the sky is cloudy at sunset – call 26-2363 to check on the status. Many members bring their telescopes; visitors are welcome to do likewise. Peach Mountain is home to millions of hungry mosquitos – bring insect repellent, and wear warm clothes, as it gets cold at night!

☞ Dues:

Membership dues in the Lowbrow Astronomers are \$20 per year for individuals or families, and \$12 per year for students. This entitles you to use the 24" McMath telescope (after some training). Dues can be paid to the club treasurer, Ron Avers, at a meeting or by mail at this address:

9394 Anne
Pinckney, MI 48169-8912

☞ Magazines:

Members of the Lowbrow Astronomers can get a discount on these magazine subscriptions:

Sky and Telescope: \$20 / year

Astronomy: \$16 / year

Odyssey: \$16.95 / year

For more information, contact the treasurer.

☐ Sky Map:

The sky map in this issue of *REFLECTIONS* was produced by Doug Nelle using *Deep Space 3D*.

✎ Newsletter Contributions:

Members (and non-members) are encouraged to write about any astronomy-related area in which they are interested. Please call the newsletter editor (Kurt Hillig, 663-8699) to discuss length, format, etc. Announcements and articles are due 14 days before each monthly meeting. Contributions should be mailed to Kurt Hillig, 1718 Longshore Dr., Ann Arbor, MI 48105.

☎ Telephone Numbers:

President:	Stuart Cohen	665-0131
Vice Pres:	Doug Nelle	996-8784
	Paul Etzler	426-1941
	Fred Schebor	426-2363
	Tom Ryan	662-4188
Treasurer:	Ron Avers	426-0375
Observatory:	D. C. Moons	254-9439
Newsletter:	Kurt Hillig	663-8699
Membership:	Steve Musko	426-4547

Peach Mountain Keyholder:

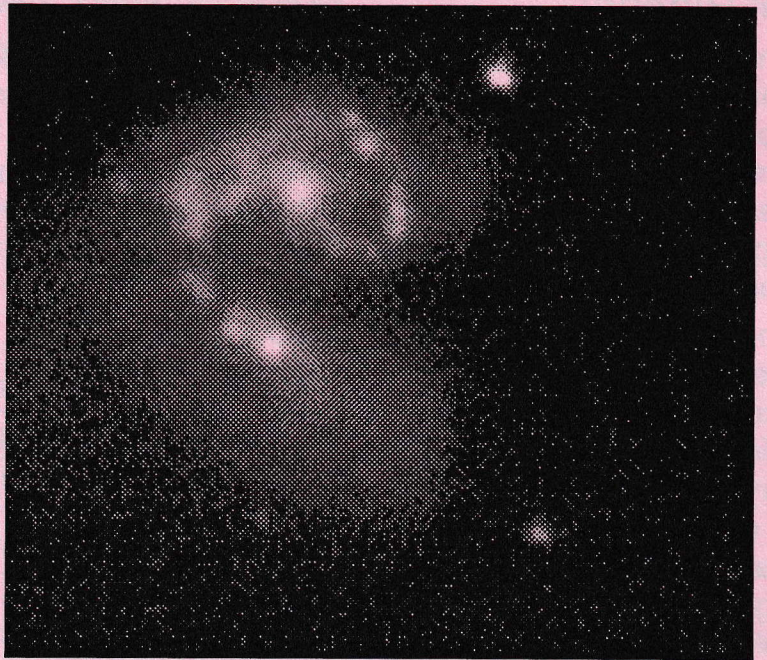
Fred Schebor 426-2363

Monthly Meeting:

Dr. Richard Teske
on
Mysterious
Geminga:
The Rise
and Fall
of a Naked
Neutron Star

March 19, 1993 at 7:30 PM

At the
Detroit Observatory in
Ann Arbor



NGC 4038 and NGC 4039 (the "Rat-Tail" galaxies) imaged by Roger Tanner and Brian Close with an ST-4 CCD camera on a 17.5" f/4.5 telescope. A ten minute exposure, this was taken at the 1993 Winter Star Party in Florida. The long tails are not visible here as they extend beyond the field of view of the CCD.

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