

The OBSERVER



The Newsletter of the Twin City Amateur Astronomers, Inc.

July 2001 Volume 26, Number 7

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Who Discovered the M Objects?

— Ray Harris

Our never-ending quest for top-grade articles took us a little further afield than usual -- and in a queue for a New York ferry had a splendid conversation with Ray Harris of the LeHigh Valley Amateur Astronomical Society (www.lvaas.org)

IMEAN, after all, you didn't really think that Charles Messier bagged all the best and brightest deep sky objects all by himself, did you? While he claimed to have seen the first 100 objects on his list, he wasn't the discoverer of them all.

Some of the brightest objects actually were

known before the invention of the telescope. Coma Berenices, the Pleiades (M45), the double cluster in Perseus, and Praesepe (M44) were all known into



About this portrait, Messier wrote: "This portrait is a good likeness, except that I appear younger than I am, and I have been given a better expression than I have

antiquity. Ptolemy listed M7 in the *Almagest* about AD 138, and the famous Persian astronomer, Al Sufi, recorded the Andromeda galaxy (M31) in AD 964, although it was unknown in Europe until Simon Marius picked it up with a telescope in 1612. And of course, the Large and Small Magellanic Clouds were discovered by Europeans in 1520 when they finally ventured far enough south to see them.

Once the telescope was invented around 1608,

continued on p. 6

TCAA Calendar

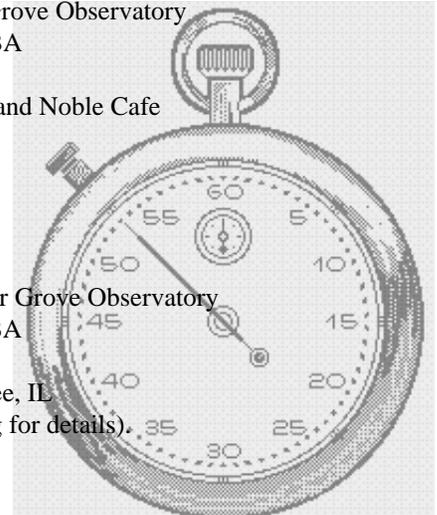
Saturday, 28 July, 9:00 - 11:30 PM, Sugar Grove Observatory
Public Observing Session. Coordinator: TBA

Monday, 6 August, 7:30 - 9:00 PM, Barnes and Noble Cafe
TCAA Reading Group. Selection: Parallax

Saturday, 18 August, Sundown, SGO
Members Only Observing Session (MOOS).

Saturday, 25 August, 8:30 - 10:30 PM, Sugar Grove Observatory
Public Observing Session. Coordinator: TBA

13-16 September, Camp Shaw-Waw-Nas-See, IL
Astrofest. (See <http://www.chicagoastro.org> for details).



The Observer

The Newsletter of the TCAA, Inc.

The Observer is a monthly publication of the Twin City Amateur Astronomers, Inc., a non-profit organization of amateur astronomers interested in studying astronomy and sharing their hobby with the public.

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Articles, ads, etc., are due by the 1st weekend of each month. Items may be e-mailed to: mprogers@mail.millikin.edu, or jmemken@ilstu.edu

Dues

\$25.00 per household, per year
\$15.00 for members over 60
\$12.00 for newsletter only
\$ 1.25 for a single newsletter copy

Etc., Etc., Etc.

— Michael P. Rogers

Warning: Like a piece of ill-fated luggage mauled by the Denver International Airport automated baggage-handling facility, I'm only partially here. My body is sitting at a computer, while my brain is somewhere else, still on vacation. So, please set your wheat-from-chaff filters to maximum before proceeding.

WHILE queuing for the Manhattan ferry on Ellis Island, I had the good fortune — thanks to a shirt emblazoned with a picture of the Milky Way and a “you-are-here” arrow — to fall into a conversation with Ray Harris, a member of the Lehigh Valley Amateur Astronomical Society (www.lvaas.org). A quick glance at their web site confirms Ray’s assertion that his group is wildly successful. They have two observing sites, including one in the middle of the Appalachians. Just their equipment list is imposing — a 12.5 and 17.5 inch Dobsonian, 2 12.5 inch Newtonians, and, apparently under construction or refurbishment, a 20 and 40 inch Cassegrain. They offer formal, 12 week astronomy classes to the public and to Boy Scouts, have a telescope making class... the list goes on and on. The LVAAS membership is around 250, and their main problem is lack of meeting space. Oh, to have those problems!

It is true that the LVAAS does have a *slightly* larger population base on which to draw; they attract people from all over Pennsylvania and New York, for whom \$45 for a dark-sky site is a bargain. But they do have a large core of active participants, and a correspondingly large set of activities to keep people interested. You *don't* want to know what their annual budget is.

Here on the homefront, Dan Miller, Jim Brown and I are preparing to offer our second Starry Night Workshop at Millikin University. Thanks to a generous grant

from the James Millikin Estate, Decatur elementary school teachers will be trained on how to use Starry Night Pro, as well as an LX-200 equipped with an STV (SBIG’s new CCD camera with the built in video screen). At the end of the workshop the teachers get to take a copy of Starry Night with them, and they can check out the LX-200 anytime they want to. The workshop, including dinner, is free for the teachers.

Because we have nothing better to do, Jeannie, Jim Brown and I have started working on a survey of elected officials on the topic of light pollution. Actually “started working” understates our efforts — we’ve written all the questions, and are in the process of revising it. Jim, of course, is the official astronomer on the project, Jeannie is the statistician, and I’m the... typist. Since light ordinances are local, we’re aiming locally — we plan to send out 750 surveys, around the country, to city mayors. As far as we can tell, this has never been done before, and even if it has, we’re bound to learn something worthwhile.

In a desperate attempt to cheer myself up, for the last few days I’ve been writing a planetarium show, “M. Messier Lives Upstairs Duct-Taped to the Ceiling”. I have no idea whether it will see the light of day, but writing it has been (sort of) fun. I’m hoping that 3M will sponsor it, and that I can retire off of the royalties. (Or failing that, get sued by 3M, counter-sue, and live off of the disgustingly large award that a sympathetic and slightly gullible jury will give me for pain and suffering).

On the Road to the Edge of the Universe

— Jean Memken

I AM seriously thinking about organizing a club field trip. In the past two weeks I have been to two wonderful destinations for amateur astronomers and I think we should all pack, and do a road trip to either one or the other (of if we had about a month, to both).

Two weeks ago, my family and I embarked on a trip to New York City. We took in all the real tourist sites like the Statue of Liberty, Ellis Island, the Empire State Building and Broadway. But one whole day of our trip was devoted to the Rose Center for Earth and Space and the Hayden Planetarium, located in the Central Park West district of Mid-Town Manhattan. I think it must be one of those “hidden jewels” in New York. It’s not really in a very prominent location and we had to take a subway ride and then walk quite a few blocks in order to get to it. I had never even heard of it until one of my colleagues at ISU who knew my interest in astronomy told me about it. Believe me, though, it was well worth the effort it took to get to it.

Fast Facts

Hours:

Sun-Thurs 1000-1745
Fri & Sat 1000-2045
Closed Thanksgiving &
Christmas

Admission:

Adults \$10.00
Students/Seniors \$7.50
Children \$6.00

Transportation:

Subway:

B (weekdays) or C to 81st;
1 or 9 to 79th

Bus:

M7, M10, M11 or M104 to
79th; M79 to Central Park West

The Rose Center bills itself as a museum for the 21st century. It certainly looks the part. The whole center is enclosed in a huge glass block, with the planetarium, an 87 foot sphere (that’s right, sphere, not hemisphere) located right in the middle. This building is joined to the American Museum of Natural History, and encompasses about 350,000 square feet of exhibition space. So you can see, a visit to the Center is an all-day affair.

One of the most interesting exhibits in the Rose Center is entitled, “Size Scales of the Universe”. It consists of a series of small panels that surround the Hayden Planetarium and use it as a reference point to make one understand the size and scale of our universe. For example, if the planetarium (remember it’s 87 feet in diameter) represented our Sun, the Earth would be only 10 inches in diameter. Likewise, if the Hayden sphere represented a raindrop, then the size of one of our red blood



Hayden Planetarium Interior

The completed Rose Center just opened in February of 2000. It includes not only the planetarium, but also the Cullman Hall of the Universe and the Gottesman Hall of Planet Earth. The museum is dedicated to three great areas of science, astrophysics, astronomy and geology. It is truly the best attempt I have seen to take these three rather complex, abstract areas of science and make them accessible and comprehensible to the general public. I can’t imagine anyone not coming away from the Rose Center with a greater appreciation of the cosmos and our place in it.

cells would be about 8 micrometers. Smaller models of the objects being compared are located next to each panel, and so it gives one a real sense of what “big” and “little” really mean when it comes to the cosmos.

The Hayden Planetarium is absolutely unbelievable. It is housed in the upper part of the sphere, and holds 429 high backed padded seats that slope gradually down from the outer wall. The state of the art projection equipment and the

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dome, which envelops the audience, are used in conjunction to present a sky show with virtual reality that makes the observer really feel like he/she is traveling through space. The show we saw was devoted to our cosmic address. It was narrated by Tom Hanks and was produced exclusively for the Hayden Planetarium. At the beginning of the show, we were told that we were going to discover our place in the universe by traveling through the various hierarchy of our space address. Then the whole planetarium, our space ship, took off – not really, but with the computer imaging on the dome, the surround sound, and the motorized seats that began to shake, it really seemed like we were taking off, very much like the effect one gets in an IMAX theater, only better. We started our journey in our own solar system, and as we traveled further away from earth we could see each of the planets as we traveled by (except Pluto which the Rose Center will not acknowl-



Rose Planetarium at night



Hall of the Universe (with Hayden sphere above)

edge as a real planet). Then we traveled beyond our solar system into the Milky Way. On a side trip at this level, we went to the Crab Nebula (using the closest thing to Warp Drive) and not only did we go to it, but we actually went inside it where we could see new stars being born. From the Milky Way we traveled light years to see ourselves from the Virgo Supercluster which comprises several galaxies, including our own. From there we went to the edge of the known universe. At that point, it was very easy to understand what a small speck we are when it comes to the universe. The show ended with a trip down a black hole. Because no one has actually ever been down a black hole, it was all pure speculation, but my whole family agreed it was a great trip, rivaling any roller coaster ride at your favorite amusement park.

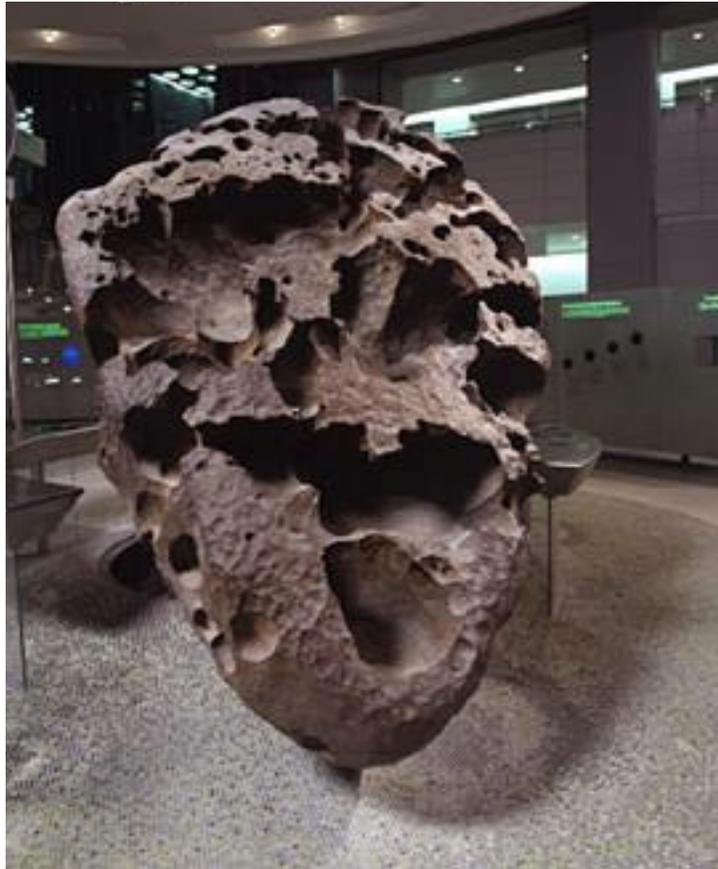
We made it home from New York via a marathon 2-day road trip through New Jersey, Pennsylvania, Ohio, Indiana, and

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finally, Illinois. We arrived home weary from our drive, but the whole trip seemed almost like nothing, now that we have traveled to the edge of the know universe, thanks to the Rose Center and the Hayden Planatarium.

Ready to pack your bags? Next month, I'll tell you about my other great destination for our club field trip. It doesn't have the glamour and glitz of NYC, but if you are looking for a great night sky, this next place can't be beat.



Wilmette Meteorite (in the Hall of the Universe)

Public Observing Sessions (POSs)

<u>Date</u>	<u>Time</u>	<u>Astronomical Twilight</u>
31 March, 2001	7:30 - 9:30 PM	7:20 PM
28 April, 2001	8:30 - 10:30 PM	8:32 PM
26 May, 2001	9:00 - 11:30 PM	10:14 PM
23 June, 2001	9:00 - 11:30 PM	10:36 PM
28 July, 2001	9:00 - 11:30 PM	10:17 PM
25 August, 2001	8:30 - 10:30 PM	9:17 PM
22 September, 2001	8:00 - 10:00 PM	8:24 PM

All POSs are free and open to the public, but TCAA members are especially encouraged to come out. Sky charts and munchies will be provided by the coordinators and/or their seconds. In the event of rain, the event will be canceled.

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things began to warm up. Many discoveries went unrecorded or were lost to history. We must credit the discoveries to those who managed to get the word out to their contemporaries. Based on this “rule”, Christian Huygens gets credit for the Orion Nebula (M42) in 1656, although we know today that it was discovered by Nicholas Piersec in 1610 with a telescope given to him by Galileo.

Abraham Ihle gets credit for the first globular cluster (M22) in 1665, but the 20-year old Edmund Halley got “the big one” - Omega Centauri - in 1677 on a trip to St. Helena. Since Halley also discovered M13 in 1714, he got the best globular in both hemispheres (but nothing else).

In 1680, John Flamsteed found the cluster in M8 (the nebula escaped detection until



John Flamsteed

1749 by Guillaume Le Gentil). Flamsteed also gets credit for the open clusters NGC 2244 in Canis Major (1690) and M41 in 1702. Gottfried Kirch found the beautiful M11 in 1681, and M5 in 1702. Jacques Cassini reported that his father, Giovanni, had discovered an open cluster (M50) sometime before 1711. And Jean-Jacques de Mairan bagged M43 about the time of Charles Messier’s birth in 1730.

Before poor Charles could grow up and start hunting for comets, a number of other deep sky objects were claimed. John Bevis got M1 in 1731. Then Philippe de Cheseaux found nine deep sky objects including M4, M6, M16, M17, M25, M35 and M71 in 1745-1746. Jean-Dominique Maraldi gets credit for M15 and M2 in 1746 and Le Gentil found M32, M36 and M38 (along with the nebula in M8) in 1749.

Nicholas-Louis de la Caille went to the Cape of Good Hope in 1751 and over the next two years recorded 24 new deep sky objects. Only three of these - M55, M69, and M83 - were far enough north for Messier to observe and include in his famous list. Amazingly, Lacaille is credited with the discovery of the open cluster NGC 6231 in the tail of Scorpius. During my own research into the depiction of deep sky objects on early star atlases, I found NGC 6231 portrayed clearly as a nebula on Johann Hevelius’s spectacular atlas of 1687. Hevelius based his charts of the southern sky on Edmond Halley’s catalogue from his trip to St. Helena in 1677. Halley clearly reported this “nebula in the third joint” of Scorpius. So Halley actually bagged three deep sky objects, though he gets credit for only two by our “rules”.

It wasn’t until 1764 that Charles Messier reported his first discoveries. Now things would really heat up. In that year he discovered M3, 9, 10, 12, 14, 18-21, 23, 26-30, 33-34, 37, and 39. In 1771 he published his first list with 45 objects. That year he added M46-49 and M62, and in 1773, he found M110, and the larger part of M51, followed by M52 in 1774. In 1774 to 1779, John Bode picked up M53, 64, 81, 82, and 92. Messier bagged M54 in 1778, and M56 and M58 in 1779. Meanwhile, also in 1779, Johann Koehler discovered M59, M60 and M67, Antoine D’Arquier found M57, and Barnabus Oriani picked up M61.



Codifier and namesake of the Ptolemaic system, author of the Almagest, and geographer extraordinaire... Ptolemy!

Next, Pierre Mechain entered the fray with M63 in 1779 and M65, 66, 72, and 74-79 in 1780. That year Messier published an addendum to his list of 1771, bringing the total to 68. Messier picked up M70 later that year, and M80, 84, 86-91 and 93 in 1781. Mechain was busy in 1781 too, finding the little companion part of M51, M85, M94-101, and 103-106. He finished off with M107-109 by April of 1782.

Messier’s final list only included up to M103. The remaining seven objects were added since 1920. Flamarrion added M104 in 1921, Hogg added M105-107 in 1947, Gingerich added M108 and 109 in 1960, and Glyn Jones added M110 in 1966.

So there you have it. Of the 110 objects in Messier’s list today: Messier only discovered 39 plus the big half of M51; Mechain found 27 plus the small half of M51; De Cheseaux bagged 7; Bode found 5; Le Gentil discovered 3 plus the nebulous part of M8; Lacaille and Koehler

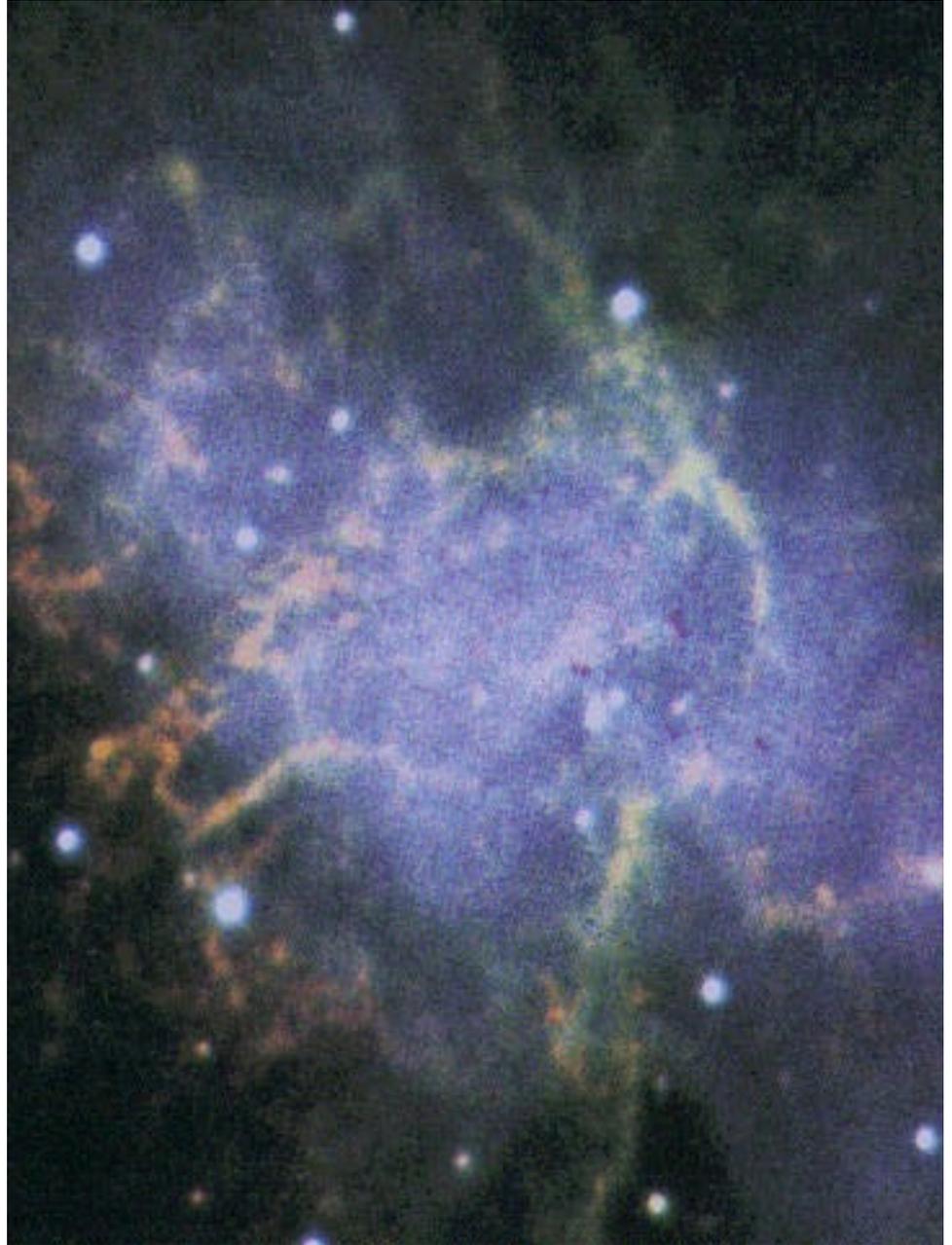
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each get credit for 3; Kirch, and Maraldi each got 2; and Halley, Ihle, De Mairan, Cassini, Bevis, Oriani and Darquier each bagged 1. Piersec and Huygens get to share M42, and Flamsteed gets credit for M41 and the open cluster in M8. Four of Messier's objects - M7, M31, M44 and M45 - were known by the end of the 10th century. M24 is a Milky Way star cloud, M40 and M70 are only chance groupings of a few stars, and M102 was a mistake - Mechain admitted sheepishly that it was a duplicate discovery of M101!

Up until the time of Charles Messier's birth in 1730, only 12 of "his" objects had been discovered, plus the cluster in M8. By the time he bagged his first object in 1764, the list had grown to 29 (including the nebulosity in M8). With the work by William Herschel, the list of deep sky objects had grown to more than 2,500 by 1800, but that's another story.

(Most of the information above was extracted from "The Search for the Nebulae", by Kenneth Glyn Jones, 1975, published by Alpha Academic)



Messier's First Find, the Crab Nebula (aka M1)

Imagine your Ad Here!

Contact The Observer sales team (309-828-8655) for details.

Hubble Captures Best View of Mars Ever Obtained from Earth

— StScI

FROSTY WHITE water ice clouds and swirling orange dust storms above a vivid rusty landscape reveal Mars as a dynamic planet in this sharpest view ever obtained by an Earth-based telescope.

NASA's Earth-orbiting Hubble Space Telescope took the picture on June 26, when Mars was approximately 43 million miles (68 million km) from Earth -- the closest Mars has ever been to Earth since 1988. Hubble can see details as small as 10 miles (16 km) across. The colors have been carefully balanced to give a realistic

view of Mars' hues as they might appear through a telescope.

Especially striking is the large amount of seasonal dust storm activity seen in this image. One large storm system is churning high above the northern polar cap [top of image], and a smaller dust storm cloud can be seen nearby. Another large dust storm is spilling out of the giant Hellas impact basin in the Southern Hemisphere [lower right].

Hubble has observed Mars before, but never in such detail. The biennial close

approaches of Mars and Earth are not all the same. Mars' orbit around the Sun is markedly elliptical; the close approaches to Earth can range from 35 million to 63 million miles.

Astronomers are interested in studying the changeable surface and weather conditions on Mars, in part, to help plan for a pair of NASA missions to land rovers on the planet's surface in 2004.

The Mars opposition of 2001 serves as a prelude for 2003 when Mars and Earth will come within 35 million miles of each other, the closest since 1924 and not to be matched until 2287.

Image Credit: NASA and the Hubble Heritage Team (STScI/AURA) Acknowledgment: J. Bell (Cornell U.), P. James (U. Toledo), M. Wolff (Space Science Institute), A. Lubenow (STScI), J. Neibert (MIT/Cornell)



Skyline!

The Official Voice of the ISU
Planetarium/TCAA

438-5007

SIMplicity

— Michael P. Rogers

Caution: Difficult concepts ahead!

HANDS up, all of you who know what SIM stands for? And for those of you who started thinking about the Electronics Arts game, put them down. SIM, short for Space Interferometry Mission, is an ambitious and audacious plan by NASA to, in the words of their marketing division, “Take the Measure of the Universe”. This article will provide a brief overview of the project.

In recent years, astronomers have discovered numerous planets orbiting stars. Unfortunately, the only planets that they are currently capable of detecting are Jupiter-sized and larger, for only such humungous planets are able to jostle a star sufficiently that its movement can be detected using current technology.

SIM hopes to remedy that: one of its primary goals is to look for earth-sized planets, ones more likely to support life.

SIM also hopes to plot the location, distance, and movement of stars with unparalleled accuracy. In a magnificent metaphor, NASA suggests that SIM will be able to detect how much your grass has grown, in one second, from a distance of 10 kilometers. Clearly some sort of breakthrough technology is at work here

(either that, or most of the taxpayers dollars being sent to NASA are *really* being spent on lawn-mowing :-).

In truth, the breakthrough technology is based on something quite old — interferometry, a technique pioneered in the 19th century by Albert Michelson, who won the Nobel Prize in Physics for his efforts in 1907. (If the name sounds familiar, it should be: the Michelson-Morley experiment convincingly disproved the notion that light travelled through an undetectable substance known as the aether).

Interferometry takes light from two detectors, separated by some distance, and combines them together. The result is a detector whose effective *resolving power* — a measure of the closest stars that it can discern as two distinct points — is that of a telescope as large as the distance between the two detectors. For instance, if you took two detectors and placed them a kilometer apart and combined the signals using interferometry, you would end up with a device with the resolving power of a telescope with a kilometer-wide mirror. (I wonder how long it would take to grind one of those :-)



painted black everywhere except at two locations, a kilometer apart, on the circumference of said mirror.

So, what good is an interferometer?

When you combine the output of the two detectors, thanks to the wave nature of light you are rewarded with a series of alternating black and white lines known as *fringes*. By measuring various aspects of those fringes, it is possible to measure a star’s diameter, motion, and, in some cases, surface features. And, measuring motion relative to background stars, we are able to measure parallax with tremendous accuracy. And if that doesn’t seem impressive, go back and read last month’s Beginner’s Corner article (also available on the web site) on parallax!

Interpreting fringes is not easy, and we will gladly postpone discussion of the abstruse details for another time, up to and including never. But NASA clearly has the process in hand: they have been hard at work on SIM for some years, and hope to have it launched by... well, it used to be 2005; now thanks to various budget cuts, by 2009. The SIM instrument will consist of a 10 meter long boom, with 3 separate interferometers. Two of the interferometers will gather data from guide stars, which will be used to calibrate data from the third, which will be aimed at targets of interest.

SIM will operate in the same orbit as the Earth, lagging by approximately 95m kilometers.

For more information, be sure and check out the SIM web site, sim.jpl.nasa.gov.



A potential design for the SIM project

This may sound like the bargain of the century — a telescope with a kilometer-wide mirror, but there is, inevitably, a catch: interferometry does *not* produce a particularly useful optical image. This is because you really don’t have a fully-functional kilometer wide mirror, but instead one that has been subject to the indignity of being

Treasurer's Report — May 2001

— Duane A. Yockey, Treasurer

OPERATING FUND BALANCE – April 30, 2001 - \$1,507.89

Income

Mary Kay Herrmann (dues) -	\$ 25.00
Thomas & Lisa Banasik (dues) -	\$ 25.00
Michael & Donna Miller (dues renewal) -	\$ 25.00
Timothy & Christi Henning (dues renewal) -	\$ 25.00
James & Pam Wall (dues renewal) -	\$ 15.00
Jenkins & Jennifer Fowles (Observer subs)	\$ 12.00

Expenses

Abrams Planetarium (sky calendars)	\$171.60
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OPERATING FUND BALANCE – May 31, 2001 - \$1,463.29

OBSERVATORY FUND BALANCE – April 30, 2001 - \$ 361.31

Income

None

Expenses

Eyepieces for Observatory	\$240.35
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OBSERVATORY FUND BALANCE – May 31, 2001 - \$ 120.96

The Observer Crossword

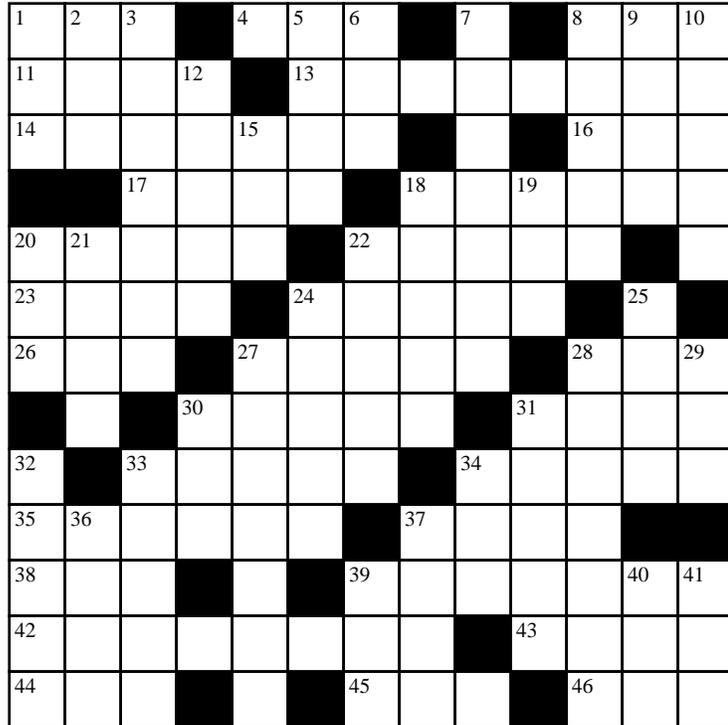
—Observer Staff

ACROSS

- 1 22nd Greek letter
- 4 Flow back
- 8 Policeman
- 11 Juniper
- 13 Large owl
- 14 Portal
- 16 Honey insect
- 17 Put down
- 18 Japanese form of self-defense
- 20 Intertwine
- 22 Cuttlefish
- 23 Obscurity
- 24 Russian measure of distance
- 26 Supplement
- 27 Lofty nest
- 28 17 Greek letter
- 30 The last Greek letter
- 31 Feat
- 33 Frighten
- 34 Nickel-cadmium battery
- 35 Flower parts
- 37 Disk on which 84% of star's light is concentrated
- 38 Monkey
- 39 Small charcoal brazier
- 42 Traveler on the sea
- 43 Dressed
- 44 13th letter of the Hebrew alphabet
- 45 Alkali
- 46 Ariane's developer (abbr)

DOWN

- 1 The astrophotographer's toy
- 2 Monetary unit of Vietnam
- 3 Worship as a god
- 5 Glass ornament
- 6 Body of water
- 7 Kepler's favorite shape?
- 8 Perchlike game fish
- 9 Was indebted to
- 10 Abdomen of a crustacean
- 12 Efface
- 15 Intelligence
- 18 Operatic feature/bright region on Mars
- 19 Equipment
- 20 Definite article
- 21 Become roused from sleep
- 22 Twill-weave fabric
- 24 Turns away
- 25 Moon of Saturn discovered in 1672
- 27 Dental filling
- 28 Adapt for new use
- 29 Eccentric
- 30 Wood sorrel
- 31 He predicted the existence of the positron
- 32 Sudden convulsion
- 33 Water vapour
- 34 Penpoint
- 36 Fencing sword
- 37 Disk on which 84% of star's light is concentrated
- 39 Norse goddess
- 40 Possesses
- 41 Guardian of the Dark (Sky)



The Welcome Mat

Woah, 8 new members this month! While the cherubs attempt to figure out how to play *Happy Days Are Here Again* on the trumpets, let's give a warm welcome to...



Sue Fancher
Hudson

Kathryn Kerr & Sarah Palmer
Bloomington

Wally Mead
Bloomington

Shaukat & Farida Goderya
Bloomington

Randy & Megan Ozdyck
Normal, IL



The OBSERVER

The Newsletter of the Twin City Amateur Astronomers, Inc.

Michael Rogers & Jean Memken, Editors
2206 Case Drive
Bloomington, IL 61701

Dues Due?

The Dues Blues

If you see a check in the box above, it means **your dues are due**. To retain membership -- and with a new observatory, why quit now??? -- please send \$25 to our esteemed treasurer:

Duane Yockey
508 Normal Avenue
Normal, IL, 61761

As always, thank you for your support!!