



Current Astronomy

JULY
2005

RIVER BEND ASTRONOMY CLUB NEWSLETTER



What's inside a comet? Deep Impact, a space probe designed to hurl an "impactor" at comet 9P/Tempel 1 and thereby shatter part of the comet, will gather data that could help scientists understand the formation of the solar system. IMAGE: NASA/JPL/UMD

RIVER BEND ASTRONOMY CLUB

River Bend Astronomy Club serves astronomy enthusiasts of the American Bottom region, the Mississippi River bluffs and beyond, fostering observation, education and a spirit of camaraderie.

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Affiliated with the Astronomical League, dedicated to fostering astronomical education, providing incentives for astronomical observation and research, and assisting communication among amateur astronomical societies.
www.astroleague.org



Affiliated with the NASA Night Sky Network, a nationwide coalition of amateur astronomy clubs bringing the science, technology and inspiration of NASA's missions to the general public.
nightsky.jpl.nasa.gov

Current Astronomy CLUB NEWSLETTER

EDITOR Eric Young
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Monthly Meeting

Saturday, July 9th, 2005 • 7:00 p.m.

Kronk Observatory

132 Jessica Drive, St. Jacob, IL 62281

Looked up lately?

Join River Bend Astronomy Club

Want to learn more about astronomy? The members of River Bend Astronomy Club invite you to join. You won't need expensive tools or special skills — just a passion for observing the natural world.

- Meetings offer learning, peeks through great telescopes and fun under the stars.
- You will receive the club newsletter, *Current Astronomy*, packed with news and photos.
- Get connected with our member-only web site and discussion group.
- Borrow from the club's multimedia library.
- And that's not all! Through club membership you also join the Astronomical League, with its special programs and a colorful quarterly newsletter to enrich your hobby.

We meet monthly, observe regularly, e-mail news and quips constantly, and generally have a good time. Won't you join us?

Name(s) _____

Address _____

City _____ State _____ Zip _____

Phone (Day) _____ (Evening) _____

Email address (to receive club news and information): _____

Where did you hear of our club? _____

How long have you been interested in astronomy? _____

Do you have optical equipment? Telescope Binoculars

Are you afraid of the dark? Yes No (just kidding)

I am submitting my application for:

_____ Adult membership(s) _____ Youth membership(s)
@ \$20.00/year @ \$15.00/year
(18 years or older) (under 18)

I enclose a check for a total of \$ _____
made out to "Mike Veith, Treasurer, RBAC."

Signature _____

Date _____



River Bend Astronomy Club

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SEPTEMBER 04

Honey, I shrunk the universe

Scaling the cosmos requires thinking big

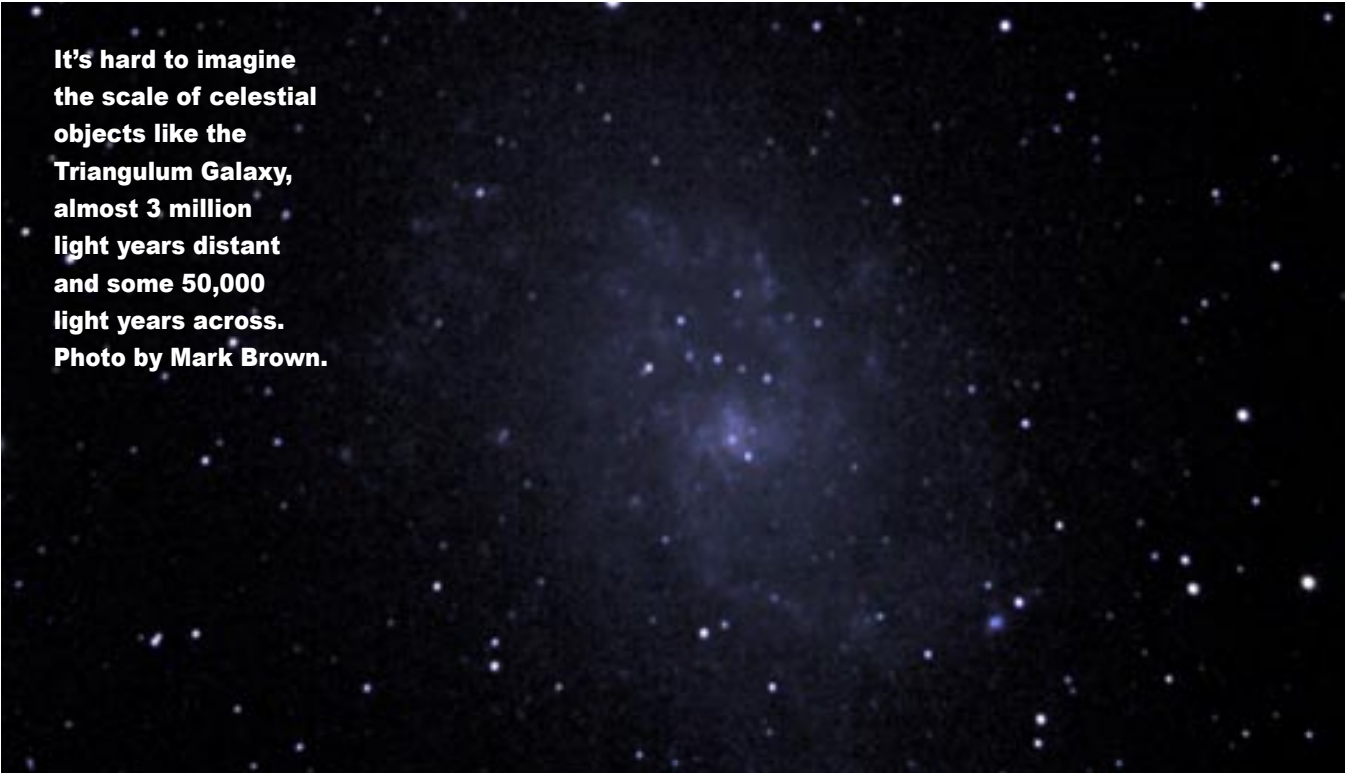
BY JACE PERHAM

I've always been fascinated with the size of our universe. The problem, though, with the size of the universe is...it's the size of the universe, which makes it somewhat difficult to grasp. It's like trying to grasp infinity + 1. It can't be done. In order to get an idea of how big the universe is you have to scale it down to a size so that it can at least fit into your imagination. If you recall seeing a scale version of our solar system during Astronomy Day then you'll understand why scaling *down* is necessary in order to understand how much space there is between the Sun and Pluto as well as objects that are much farther away.

In this article I'm going to put the Sun in the dryer (this is where the imagination needs to kick in) and shrink it down to one inch, about the size of a quarter. If you'd like to try this on your own using your own scale, the only tools you'll need are the universe and one really big calculator.

We'll begin our modeling with the Solar System. Since we've scaled down the Sun, which started out at 864,000 miles in diameter B.D. (Before Dryer) down to 1" in size A.D. (After Dryer), we can use the same scale to measure distance. So, taking the diameter of the Sun, 864,000 miles and dividing it by 1 will give you a scaled down version of — you guessed it, 864,000 miles to an inch. For example, we know that the Earth is about 93 million miles from the Sun. If we divide 93,000,000 by 864,000 we end up with our shrunken down Earth a distance of about 8.9 feet from the quarter. (You'll have to forgive me for using scientific terms like shrunk, shrank, shrink, and shrunken.) The same distance from the Sun can be worked out for the rest of the planets. (See the chart, next page.)

As you can see, shrinking the Sun to size of a quarter still puts Pluto a little more than the length of a football field away. Reach in your pocket and pull out



It's hard to imagine the scale of celestial objects like the Triangulum Galaxy, almost 3 million light years distant and some 50,000 light years across. Photo by Mark Brown.

Planet	True distance from the Sun (miles)	Scale distance from a quarter (feet)
Mercury	36,250,000	3.5
Venus	67,500,000	6.5
Earth	93,000,000	8.9
Mars	142,438,000	13.7
Jupiter	486,250,000	46.8
Saturn	891,875,000	86
Uranus	1,794,375,000	173
Neptune	2,815,000,000	271.5
Pluto	3,687,500,000	355.6

a quarter. Now think about how far 118 yards is from that quarter. Better yet, if you can, set it down and walk a hundred yards away. You almost need binoculars to see it from that distance! And that's just the beginning!

Now let's talk about a light year. Light travels at the speed of roughly 186,282.397 miles in one second. Roughly. So the distance light travels in one year equals about 6 trillion miles. (6,000,000,000,000 miles) If we fit this to our quarter/Sun model, the distance of our scaled down version of a light year would equal about 109.6 miles. With Pluto a little more than a football field away from the quarter/Sun, 355.6 ft., our light year will stretch from St. Louis to just beyond Springfield, IL, 109.6 miles. That's just a wee bit farther than I can throw a football. So far we can still fit this into our imagination — so let's take it to the next step.


Proxima Centauri, the closest star (excluding our Sun), is 4.3 light years away. It measures about 471.2 miles away using our quarter/Sun model or, approximately from St. Louis to a couple hundred miles past Chicago, or a 7.5 hour drive in any direction at 65 miles per hour. This is still an imaginable distance. Next stop, the Galaxy!

So how big on the quarter scale would that make our Galaxy? Well, it still boggles my mind when I think

about it. Our Galaxy, The Milky Way, is about 100,000 light years in diameter. Now remember, Pluto would be only 355.6 ft. (that's ft. as in feet!) from our quarter/Sun. If you started from our quarter/Sun and went the diameter of our galaxy, the distance you would have to travel would be...are you ready? The distance would be about 10,960,297.4 miles. Compare that distance from the quarter you pulled from your pocket and that equals about 46 trips back and forth to the moon!! Whew! What a huge place we live in. Kind of knots up the brain, doesn't it!

Let's take it further, or should I say farther. Our nearest galaxy, the Andromeda Galaxy located about 2 million light years away, would be about 219,205,948.3 miles away using our model. If you look at the above chart you'll see that would put you somewhere between Mars and Jupiter from our quarter/Sun. That's a long way from something the size of a quarter! But we're still not done.

Lastly, the size of the universe, which is estimated to be about 27.4 billion light years wide, would stretch a whopping 3,003,121,492,704.8 miles in diameter using our quarter/Sun model. That's about 44,590,780,319,126.7 times the distance from our quarter to Pluto and, as you can see, this brings us back to distances we just can't fathom.

OK, so I failed. I can't imagine 3.003 trillion miles no matter how hard I try. I guess I didn't quite get the universe down to an imaginable size. I'm going to go back to the calculator board, stick the Sun back into the dryer, and shrink it down to the size of a BB. Does anybody know the size of a BB? 

Can you imagine this?

The size of the universe would stretch a whopping 3,003,121,492,704.8 miles in diameter using our quarter/Sun model.

Observe the rules

Enjoy astronomy by following our basic guidelines

BY DEB WAGNER

Amateur astronomy is an increasingly popular hobby. That's why the club adopted these rules in 2004 to help ensure that all members and guests have a safe and enjoyable experience at our meetings. Whether you use astronomy as a way to unwind after a stressful day at work, use it to contemplate the meaning of life, or just like to look at cool stuff in the sky, the club hopes that these rules of etiquette will ensure your continued enjoyment of this rewarding hobby. ***Please note: Anyone who fails to comply with the rules will be asked to leave.***

USE RED-FILTERED FLASHLIGHTS AND SHIELD OTHER LIGHT SOURCES

Avoid the use of white lights and use red lights sparingly. Even red LED lights can spoil night vision if turned up all the way. Keep your lights directed down, on low power, and well shielded. Be certain your laptop screen is not illuminating the observing field.

AIM LASER POINTERS ONLY AT THE SKY; ADULT USE ONLY

A green laser pointer is a wonderful educational tool. It should not, however, be used as a toy. Therefore, green laser pointers should be handled by responsible adults and should only be pointed toward objects in the sky. Never aim a laser pointer at another person.

CHILDREN MUST BE SUPERVISED AT ALL TIMES

Members exchange information and ideas at meetings — please do not allow your child to disrupt the proceedings. During observing sessions, the area is dark and a great deal of expensive equipment is assembled in a small area. Help protect our members' investments and respect what they choose to share with your young ones.

NO RUNNING; NO HORSEPLAY

The observing area is not a playground — no running or horseplay will be permitted.

BE QUIET Astronomy is regarded as a peaceful, quiet hobby. For many, it leads to introspection and discussion. Avoid loud and raucous behavior. Please wear headphones if you enjoy listening to music.

BE AWARE OF YOUR SURROUNDINGS AND RESPECTFUL OF OTHERS' ACTIVITIES

Many RBAC members enjoy astrophotography and everyone attending club observing sessions should be sensitive to that fact. A poorly aimed flashlight or laser pointer can ruin an exposure. Even walking too near an astrophotographer's setup can potentially ruin what could have been a great picture.


ASK PERMISSION TO USE OTHERS' EQUIPMENT

Most telescope owners enjoy sharing their telescopes and/or binoculars. Even so, always ask permission before looking through someone else's equipment. Never use unattended equipment without permission. Never touch the surface of a lens, mirror, or eyepiece.

DO NOT SPRAY AEROSOLS NEAR EQUIPMENT

Mosquito repellent is a necessity when observing during the warmer months. Please leave the observing area to apply repellent from an aerosol can. The airborne spray can settle on eyepieces, lenses, and mirrors.

NO SMOKING Out of concern for the health of everyone and their optical equipment (smoke particles can fog optics), never smoke on the observing field.

NO ALCOHOL No alcohol consumption is permitted at RBAC meetings or club events. 

BY PATRICK L. BARRY

Moving a mountain of a dish

Your first reaction: “That’s impossible!” How on earth could someone simply pick up one of NASA’s giant Deep Space Network (DSN) antennas — a colossal steel dish 12 stories high and 112 feet across that weighs more than 800,000 pounds — move it about 80 yards, and delicately set it down again? Yet that’s exactly what NASA engineers recently did.

One of the DSN dishes near Madrid, Spain, needed to be moved to a new pad. And it had to be done gingerly; the dish is a sensitive scientific instrument full of delicate electronics. Banging it around would not do.

“It was a heck of a challenge,” says Benjamin Saldua, the structural engineer at JPL who was in charge of the move. “But thanks to some very careful planning, we pulled it off without a problem!”

The Deep Space Network enables NASA to communicate with probes exploring the solar system. Because Earth is constantly rotating, a single antenna on the ground can communicate with a probe for only part of the day, when the probe is overhead. By placing large dishes at three locations around the planet — Madrid, California, and Australia — NASA can maintain contact with spacecraft around the clock.

To move the Madrid dish, NASA called in a company from the Netherlands named Mammoet, which specializes in moving massive objects. (Mammoet is the Dutch word for “mammoth.”)


On a clear day (bad weather might blow the dish over!), they began to slowly lift the dish. Hydraulic jacks at all four corners gradually raised the entire dish to a height of about 4.5 feet. Then Mammoet engineers positioned

Giant Deep Space Network antenna in Madrid is moved using four 12-axle, 24-wheel crawlers.

specialized crawlers under each corner. Each crawler looks like a mix between a flatbed trailer and a centipede: a flat, load-bearing surface supported by 24 wheels on 12 independently rotating axes, giving each crawler a maximum load of 194 tons!

One engineer took the master joystick and steered the whole package in its slow crawl to the new pad, never exceeding the glacial speed of 3 feet per minute. The four crawlers automatically stayed aligned with each other, and their independently suspended wheels compensated for unevenness in the ground.

Placement on the new pad had to be perfect, and the alignment was tested with a laser. To position the dish, believe it or not, Mammoet engineers simply followed a length of string tied to the pad’s center pivot where the dish was gently lowered.

It worked. So much for “impossible.” 

Find out more about the DSN at <http://deepspace.jpl.nasa.gov/dsn/>. Kids can learn about the amazing DSN antennas and make their own “Super Sound Cone” at The Space Place, <http://spaceplace.nasa.gov/en/kids/tmodact.shtml>.



BY ERIC YOUNG

Fake bake? Naw, we get our rays poolside

JUNE 4, 2005 Gathering in the lingering twilight of early summer, we set up the club's P.S.T. and had a look. (See photo.) This little golden telescope elicits gasps of wonder whenever we share the view. Many thanks again to all the club members who generously donated funds to purchase this instrument.

INK BLOTS "Question: How much money did it cost for the ink to print Deb Wagner's name repeatedly on page 20 of the latest issue of the *Reflector*?" asks Astro. League correspondent Jamie Goggin. That's the page where the League lists the folks who've completed observing projects, and Deb's name is all over the place. "Deep Sky Binocular Club...Meteor Club...Universe Sampler Club. I believe she should also be listed for the Honorary Messier Club and it didn't make it to press on time. Congratulations, Deb."

PUT YOUR HANDS TOGETHER Deb recently hosted an impromptu star party. She pointed out the International Space Station as it passed over, and was delighted when the crowd applauded.

BIG SQUEEZE New to our library: A black hole education kit from the NASA Night Sky Network.



Members and guests enjoyed a peek at the high-energy world of the Sun before our part of the planet turned away for the night. Lois Butler was among those who enjoyed the view through the club's Personal Solar Telescope, or P.S.T.

KEEPING THE BOOKS Our new librarian, Kathy Davis, plans to change her name to Kathy Kronk when she weds our club president, Gary Kronk, on July 4th weekend. (There's probably a good Deep Impact/fireworks joke here, but I won't touch it.) Like two balls of hydrogen gas that coalesce in the night, may their loving fusion reaction burn brightly for all eternity.


KEEPING THE BOOKS, II Mike Veith says he'll stay treasurer until he can afford a new pair of pants. Meanwhile, he said that he's paid godaddy.com for our club domain name and web hosting services.

BUGS BEGONE So there's a new brand of wipe-on mosquito repellent. That's good news for bug-bitten astronomers — aerosols near optics are a no-no.

MOONGAZERS The parents of John Schwartz enjoyed a look at the Moon through his telescope. They were impressed with seeing mountains and craters.

ZIPPY A magnitude -5 Iridium flare brought "oohs" and "ahs" from our backyard astronomers as the satellite briefly mirrored the glare of the Sun.

RUNOFF The candidates for vice-president were: Jamie Goggin, Jeff Menz and Bill Breeden. This trio of dedicated observers made for a tough choice, but Jamie managed to buy enough votes in East St. Louis to win the election. If you need him, he'll be busy paying his debts, swabbing the deck onboard the Casino Queen.

BLAST FROM THE PAST All eyes will be watching Comet 9P/Tempel 1 when the Deep Impact probe hurls its projectile toward the comet. The impact is expected to kick up a great plume of dust which could considerably brighten the comet. Practice beforehand to track down the comet near Spica. Get more information at: http://skyandtelescope.com/observing/highlights/article_1522_1.asp 

July 2005



June 2005

S	M	T	W	T	F	S
29	30	31	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	1	2

August 2005

S	M	T	W	T	F	S
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3

■ Holidays
 ■ Moon Phases
 ■ RBAC
 ■ Space Mission
 ■ Observing
 ■ Trivia

Sun	Mon	Tue	Wed	Thu	Fri	Sat
26 ● Mercury/ Saturn/ Venus cluster	27	28 ● Last quarter 1:23 p.m.	29	30	1	2 ● Giacobini- Zinner at perihelion
3	4 ● Deep Impact! ● Independen ce Day	5 ● Tempel 1 at perihelion	6 ● New Moon 7:02 a.m.	7	8 ● Mercury at greatest elongation	9 ● RBAC meeting 8 p.m.
10 ● Schwassma nn- Wachmann 1 perihelion	11	12	13	14 ● Cassini at Enceladus ● First quarter 10:20 a.m.	15	16
17	18	19	20	21 ● Full Moon 6: 00 a.m.	22 ● Regulus close to Venus	23 ● 10th ann. discovery of Hale-Bopp
24	25	26	27 ● Last quarter 10:19 p.m.	28	29	30
31	1	2	3	4	5	6 ● RBAC meeting 8 p.m.