THE

FLINT RIVER OBSERVER

NEWSLETTER OF THE FLINT RIVER ASTRONOMY CLUB

An Affiliate of the Astronomical League

Vol. 18, No. 4 June, 2014

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Club Calendar. Fri.-Sat., May 30-31: JKWMA observings (at dark); **Thurs., June 5:** Pike Co. Library presentation (1 or 1:30 p.m.); **Thurs., June 12:** FRAC meeting/lunar observing (7-10 p.m.); **Fri.-Sat., June 27-28:** JKWMA observings (at dark).

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Vice President's Message. Something remarkable has occurred in FRAC, and **Dwight Harness** deserves the credit for it because, if things had turned out the other way we'd be blaming him for it. (Just kidding.)

So what is that something remarkable? Well, we almost always lose 10-15 members from one year to the next. People join, then find out that they don't have time for us, or that astronomy is too expensive, too complex or whatever.

This year, though, of our 37 members in 2013, **34** have rejoined in 2014. That's a retention rate of 92%, and that's remarkable! (Stop me if I'm repeating myself.) Dwight's still working on the other three.

So thanks to *you,* for helping to make it possible. We couldn't have done it without you. And thanks to Dwight for his untiring efforts to make FRAC so user-friendly that you'd want to come back for another year.

Elsewhere, here's a hearty "WELCOME BACK to ex-member **Brendon O'Keeffe** of Columbus, Ga. We're glad to have you back, man! We've missed you.

-Bill Warren

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Last Month's Meeting/Activities. Dwight Harness, Truman Boyle & yrs. truly joined **Dr. Richard Schmude** at Abbott's Farm on April 24th to show the sky to about 40 Gordon College students. The highlight of the observing was a flyover by the International Space Station. We pointed it out to the students and tried to follow it in our telescopes, but it was traveling so fast that we could only occasionally see the rectangular shape formed by its vanes. Then we went back to showing them **Mars, Jupiter, Saturn** and some open clusters and double stars.

The following two evenings were – *surprise!* – clear for our Joe Kurz observings. Our twelve attendees included: **Dwight Harness, Aaron Calhoun & yr. editor** (both nights); **Truman Boyle & Erik Erikson** (Fri. night); and **Larry Higgins, Stephen Byous** and **David & Brendon O'Keeffe** (Sat. night). With a weekend's worth of clear skies to enjoy, we made up for lost time by observing such delights as: **Syrtis Major,** a dark lava plain on Mars; two more flyovers by the ISS; 2-3 dozen Messier and other deep-sky objects including **M13,** the best globular cluster visible in

the northern hemisphere, and **NGC 5139,** the finest globular in the entire night sky.

(Regarding NGC 5139: its popular name, **Omega Centauri,** derives from the fact that, although located low in the sky as seen from northern latitudes, it was nevertheless bright enough to have been mistaken for a star by the ancient Greeks and Romans. We found it in binocs, a fuzzy tennis ball 6° above the S treeline, and then switched to telescopes to get a close-up view of its profusion of resolved stars.)

Two final bonuses rewarded our perseverance in waiting so long and patiently for a clear observing weekend: the appearance of a number of sporadic meteors on both nights, and three or more occasions on Sat. evening of satellites flying through our binocular and telescopic fields of view while we were observing other objects.

Eleven members – **Dwight Harness, Joseph Auriemma, Andy Hasluem, Steven "Smitty" Smity, Cynthia Armstrong, Aaron Calhoun, Alan Pryor, Tom Moore, Truman Boyle, Jessie Dasher** and **yr. editor** – and two visitors, **Jillian & Aaron Rafter** of Woolsey, Ga., attended our May club meeting to hear **Dr. Richard Schmude**'s lively, challenging talk about measuring the size of the martian North Polar Cap and gauging the brightness of **Mars** in infrared light.

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This 'n That. In **Sue French's** "Deep-Sky Wonders" column in the June issue of *Sky & Telescope* (p. 57), she stated that **Charles Messier** found the globular clusters **M10** and **M12** "with his 6.4-inch reflector."

Well, that brings up a problem, because for years **yr. editor, Larry Higgins** and **Smitty** have been telling you that Messier never used a telescope larger than 4.5 in. in diameter. So who's right, Sue French or us? Here's what we found out:

Messier used at least a dozen different telescopes during his 30-year search for comets during the mid-1700s. They ranged in size from several 3.5-in. refractors to reflectors as large as 7.5 in. and 8 in. However, the mirrors of the reflectors were of inferior quality because they were made of speculum, a metal with poor light-gathering power. (Glass mirrors did not appear until the 1850s.)

None of Messier's refractors were larger than 3.5 in., and none of the reflectors he used had the effective aperture (light-gathering power) of a modern 6-in. Newtonian reflector.

So, to repeat: who was right, Sue French or us? The answer is, *Both*. Messier used a 6.4-in. reflector, but it probably had at best the light-gathering ability of a modern 4.5-in. reflector.

*If you've been considering upgrading to a nicer telescope than you presently own, go to the "Market Place" link at SkyandTelescope.com and click on Refractors. There, among other telescopes for sale you'll find a 12-in., f/12.2 D&G refractor, complete with finderscope and four auxiliary solar telescopes, all of them attached to the main 'scope on a unique, custom-made Byers Series III mount. The entire assemblage is for sale at the low, low bargain price of $595,000.

Okay, maybe that's a bit steep for a slightly used telescope – but it's also a $200,000 markdown from the original resale price. Hey, you should expect to pay a little extra for the privilege of owning the baddest telescope in FRAC! (And with the $200,000 you saved you can buy a house and land for an observatory in New Mexico like **Charles Turner** did.)

On the negative side, you'll have to go to Santa Cruz, CA to pack the telescope yourself and ship it home, and they didn't say whether eyepieces are included. (Solar filters are *not* included.) They also didn't say how your family will react when you announce that, due to certain recent unforeseen expenses, their vacation plans for a trip to Disney World have been put on hold for the next 147 centuries.

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Upcoming Meetings/Activities. We'll wind up May with Joe Kurz observings on **Fri.-Sat., May 30th-31st.**

On **Thurs., June 5th,** we'll do a presentation at J. Joel Edwards Public Library in Zebulon. It will begin at 1 p.m.

To get to the library from, say, Griffin, start at Williamson Rd./Ga. 362 on the 4-lane U. S. 19/41 Bypass. From there, go 2.4 mi. S on 19/41 to the Ingles/BP/McDonald's stoplight. Turn right, and follow U. S. 19 west for 7.4 mi. to the stoplight at Ga. 18 in Zebulon. Stay on U. S. 19, and the library will be 1.2 mi. ahead on the right – there's a "Public Library"sign in front -- just past two Pike Co. schools on the left.

Our FRAC meeting/lunar observing at the Garden will be held from 7-10 p.m. on **Thurs., June 12th.** Our program will be Part 5, "Observing

the Planets With a Telescope," from the *Our Night Sky* dvd.

Finally, we'll end up the month with Joe Kurz observings on **Fri.-Sat., June 27th-28th.**

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K.I.S.S.es Sweeter Than Wine

article by Bill Warren

There's an old saying among writers and speakers that I've always tried to adhere to: *Give your audience a K.I.S.S.: Keep It Simple, Stupid!*

Trouble is, astronomy is extremely complex. Practically the only thing easy in astronomy is getting confused. If you do more than scratch the surface of any topic, you're likely to find yourself mired in a quicksand of meaningless (to us) terms and concepts. That's true whether you're a beginning astronomer or an experienced veteran.

(Incidentally, here's why I like **Prof. Stargazer** so much: he refuses to admit that there are any complex questions in astronomy. When asked a question, he gives the simplest answer possible, no matter how ridiculous it is. He's not embarrassed by his lack of knowledge: as he puts it, "You can't embarrass me, I've been embarrassed by *experts*!")

In writing articles for the newsletter, I often find it necessary to explain things that are not directly related to what I'm writing about. (You'll find examples in this article.) But if you're going to discuss astronomy topics it's important to clearly define the terms and concepts associated with them.

Anyway, my present project involves often-overlooked questions that arise from time to time. So let's start our question-and-answer session with a "simple" question that illustrates my point:

What's the difference between sound and light? The answer is obvious: you can hear sounds and see light. But that's the easy answer. Here are the other differences:

*Light is composed of waves and particles called *photons*. Sound is a wave, and has no particles.

*Light waves can travel in a vacuum (e.g., across the nothingness of deep space); sound waves require a material medium. Advertising posters for the 1979 horror movie classic *Alien* proclaimed that "In space, no one can hear you scream." But they can hear you inside the oxygen-rich material medium of the spacecraft.

*Light waves travel faster than sound waves. Light travels at 186,000 mi. per second in a vacuum. Sound waves don't travel in a vacuum at all. They travel in dry air at 767 mph.

*The speed of light in a medium is constant; the velocity of sound can change.

*Other differences are more complex. Light waves are electromagnetic waves; sound waves are mechanical. Light waves are transverse, sound waves are longitudinal. Light waves can be polarized, but sound waves cannot. And in sound waves, the particles of the medium oscillate; in light waves, the electric and magnetic vectors oscillate.

Aren't you glad you asked a simple question?

Why do we have seasons? "As Earth orbits the **Sun**, our planet's axis – the (imaginary) line through both poles – always points in the same direction *(i.e., tilted at an angle of 23.5° to Earth's orbital plane. –Ed.)*. The Sun's rays fall more directly on the Northern Hemisphere during June and south of the equator in December." (**Michael E. Bakich & Roen Kelly,** *Astronomy* [May, 2014], p. 22.)

Why are Mercury and Venus the only planets in the solar system that show Moon-like phases? They're the only ones closer to the Sun than we are. As a result, we see sunlight striking their surfaces at different angles from our point of view as they and the Earth orbit the Sun.

Mars, Jupiter, Saturn, Uranus and **Neptune** are farther from the Sun than Earth is. So while we see different portions of their surfaces as they rotate, we always see their entire sunlit disk when they're up. Which brings up the following question:

Why aren't all of the planets up every night? Sometimes – rarely – they are. They're always somewhere out there, but they travel at different speeds relative to us and each other, depending on their orbital paths and how far they are from the Sun. They are gravitationally bound to the Sun, not each other, so they don't travel together in their orbits.

Sometimes they're too close to the Sun to be seen, and at other times they're up during the daylight hours when they're hard to find and observe. Venus is, of course, the easiest to see in broad daylight, but you have to know exactly where

to look. It's a very tiny pinpoint of light in a very large blue sky.

Why don't the planets twinkle like stars do? They *do* twinkle sometimes when they're near the horizon. But the planets are much closer to us than the stars are, so we see them as disks rather than points of light like the stars. Earth's moving atmosphere can momentarily diffract (bend) starlight, causing stars to twinkle, but the planets' disks contain too much light to be affected by the atmosphere except at the horizons. There's more atmosphere for light to travel through at the horizons than when the planets are higher in the sky.

Why is it that, when Mercury and Venus appear as crescent in our telescopes, we see them naked-eye as circular? It's an optical illusion. Their proximity to Earth allows us to see them naked-eye as disks, and when they are in phases we still see so much of their light that our minds fill in the rest and they retain their disk-shapes.

Okay, let's reverse the question: Why do we see Mercury and Venus as crescent or gibbous in our telescopes? Telescopes magnify their size enough to overcome the illusion and show us their sunlit portions.

What's the difference between a nova and a supernova? A **nova** is a variable star that suddenly flares up to many times its former brilliance for a brief period before gradually fading. Such stars are known as *eruptive variables:* they vary in brightness over a period of time and occasionally erupt into sudden brilliance. Here's why:

In close binary systems – binary stars are gravitationally bound pairs of stars in which one orbits the other – when one of the stars is a faint white dwarf, gas drawn from the other star can light up the white dwarf like gasoline thrown on a fire, increasing its brightness by many magnitudes until the gases burn away. Some white dwarfs have erupted many times, but they don't self-destruct in the process. They live to shine another day.

A **supernova,** on the other hand, is an unstable, massive star that, nearing the end of its life, suddenly explodes so violently that for a short period the light from its explosion outshines all the other stars in its galaxy combined. Supernovas are the end of the line for such stars, an exceptionally dramatic and violent form of stellar suicide.

Have there ever been any supernova explosions in the Milky Way? The last supernova observed in the Milky Way was in 1604 in the constellation *Ophiuchus.* Called **Kepler's Supernova,** it occurred about 20,000 light-years from Earth and was visible during the day for more than three weeks.

Since then, the closest one was **SN 1987A** in the **Large Magellanic Cloud,** a satellite galaxy of the Milky Way. The LMC is 163,000 light-years from Earth.

(By contrast, **Andromeda Galaxy** is 2.5 million l.y. away, and the supernova that we saw at Joe Kurz recently -- **SN 2014J** -- occurred in **M82,** a peculiar galaxy in *Ursa Major* that is 12 million l.y. from Earth.)

Many astronomers believe that the red giant **Betelgeuse (Alpha Orionis)** may have already gone supernova, the light of its explosion not having reached us yet. At any rate, Betelgeuse is sitting on go. It's gonna happen, it's just a question of when.

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MATTER AND DARK ENERGY

FROM LEFT FIELD

humor by Steven "Saratoga Smitty" Smith

*(Editor's Note: Buckle up your warp drive seatbelts, folks, because **Smitty** is gonna take you for a cosmological trip like you've never imagined.)*

Since the scientific community is buzzing with talk about dark matter and dark energy these days, I'd like to offer some of my own conclusions and theories on the subject.

A New Kind of Matter: *"Doesn't Matter."* I've often spoken at schools about astronomy and shown the public the night sky in my telescope. Inevitably, questions are asked about black holes, usually by children who are fascinated with the subject. I'm no expert, but I try to answer their questions as best I can. After explaining what black holes are I tell them, *Since black holes do not emit light, they appear black. And since space is also black, I cannot show you a black hole in my telescope.*

So concerning black holes – It *Doesn't Matter*!

"Doesn't Matter" also abounds in images of cosmic microwave background (CMB) radiation. We've all seen those full-sky CMB pictures that look like the screen on a TV set that's not tuned to a channel or doesn't have its cables wired up properly. There's fuzz everywhere -- some blobs here, a few globs there and spiderlike things all over the place -- and physicists from places like M. I. T. and CalTech tell us that this *proves* that the Big Bang occurred. I say these guys are like seedy used car salesmen! There's no frame of reference for the CMB images they show us. They should superimpose those images on a visible light, full-sky picture of the same scale, and let's see if those blobs, globs and spiders match the positions of **Orion Nebula** and the **Andromeda Galaxy**. Until then, their so-called "proof" of the Big Bang "Doesn't Matter."

A New Look at Energy: "Back Up Energy" and "Muchachos." In everyday life, we're usually concerned with two basic types of energy, *potential* and *kinetic*. A 300-lb. boulder sitting atop a steep hillside has a large amount of potential energy. If this boulder rolls downhill and strikes the side of your car, it imparts a large amount of kinetic energy.

There are now two problems. The first is whether your insurance will cover the damage done to your car, but that's beyond the scope of this article. The second problem is how to get that 300 pounds of solid rock out of your front seat and "back up" to the top of the hill.

We've all heard about WIMPs (Weakly Interacting Massive Particles) and MACHOs (MAssively Compact Halo Objects). Well, here I propose to introduce a new object to explain my "Back Up Energy" theory: the *muchacho*. As my starting point I'll use **Einstein's** general relativity equation, $E=mc^2$. (Einstein once said, "God does not play dice." But as you can see from my example of the boulder suddenly rolling downhill, He bowls.)

In my new interpretation of Einstein's theory to explain Back Up Energy, "E" refers to the number of *expletives* (cuss words) used, "m" is the number of *muchachos* necessary to hoist the boulder out of your car, and "c" is for the *climbing* required to get the rock back to its original location. As you can see, the more muchachos you have and the farther the distance involved, the more dark language you will have.

Back Up Energy also has a benchmark number: once "E" reaches 186,000, the equation then becomes $E=SL$. (No, "SL" doesn't refer to the *speed of light*; it stands for "Sailor Language," because at this point the muchachos will be cussing like sailors!)

Conclusion. I find that muchachos are all around us; they are the basis for my "Back Up Energy" theory. So the next time you need to get something "back up" your hillside, use as many muchachos as you can find. You may want to cover up your ears, though.

(Editor's p.s.: On May 11th – Mother's Day – a 20-ton boulder that had been loosened by recent excavation thundered down a hill and came to rest less than 12" from a Massachusetts church. Grace Ministries pastor ***Rick LeClair,*** *who was outside talking with other members after the service when it happened, saw the whole thing. He later told a reporter, "The Lord just kinda said, 'That's enough.'")*

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Above: Lunar craters **Hansteen** and **Billy.** Photo by **Alan Pryor**. Although similar in size and depth, Hansteen (upper left, 29 mi. in dia., 4,100 ft. deep) and Billy (to its lower right, 30 mi. in dia., 4,000 ft. deep) offer striking contrasts: Hansteen's floor is rough and bright; Billy's is smooth and dark like creamy peanut butter.

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Errata. Liebig was the shadowed crater to the SSE of the crater **Mersenius** in **Alan Pryor's** photo on p. 6 of the May *Observer*.

The names of three FRAC members who worked at the Bluebirds & Bluegrass 2014 arts & crafts festival at Dauset Trails – **David, Cherrie & Sarah O'Keeffe** – were inadvertently left out of the May writeup of the event. David & Sarah showed the Sun to passersby and Cherrie passed out solar sunglasses and FRAC flyers. We apologize for the omission and thank them for their help.

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Above: Lunar crater **Mairun.** This impact crater (to the left of center in **Alan Pryor's** photo) is 26 mi. in dia. and 10,500 ft. deep. Its rim is largely intact (i.e., crater-free), and its floor is flat.

The dark feature at the upper right is **Sinus Iridum** (Bay of Rainbows). It is bordered by the whitish **Jura Mtns.,** a 150-mi. semicircle of mountains thought to be the remains of an enormous ancient crater wall. One of the mountains rises 12,700 ft. above the Sinus Iridum plain.

The smooth area below Sinus Iridum in Alan's photo is **Mare Imbrium** (Sea of Rains), which dwarfs the Bay of Rainbows in size. Only a small portion of both features can be seen here.

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Above Right: NGC 2903, a thickly elongated barred spiral galaxy in *Leo* (photo by **Alan Pryor**). Lovely and bright at mag. 9.0, NGC 2903 is a Herschel 400 galaxy "with a bright oval core and stellar nucleus inside it. Beyond the core, averted vision revealed a 6' x 2.5' mottled halo that was elongated NNE-SSW and faded evenly to the edges." (From **yr. editor's** H400 observing notes.)

In observing this bright galaxy, you'll wonder how on earth **Charles Messier** missed it: 2903 is one of the brightest non-Messier galaxies, and easy to find because it's located just 1-1/2° S of *Lambda Leo,* the mag. 4 star in front of Leo's eyes as the lion faces west in the night sky.

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Below: M5, a globular cluster in *Serpens.* If you read *Sky & Telescope,* check out the photo by **Adam Block** of **M5** on p. 61 of the June, 2014 issue. Then compare it with **Alan Pryor's** photo, and you'll agree that Alan's compares *very* favorably with the photo used to illustrate the article. (Incidentally, the two stars – **V84** and **V42** -- that Alan identifies are the two Cepheid variables that the article ["M5 Surprise", by **Howard Banich**] is about.)

Although less well known in the northern skies than **M13** ("The Great Cluster" in *Hercules*), M5 is every bit its equal in beauty, size and brightness. While observing it, you're likely to notice a 3-D effect: a teeming horde of bright stars overlying a hazy glow of fainter, unresolved stars.

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