Eugene Astronomical Society
www.eugeneastro.org

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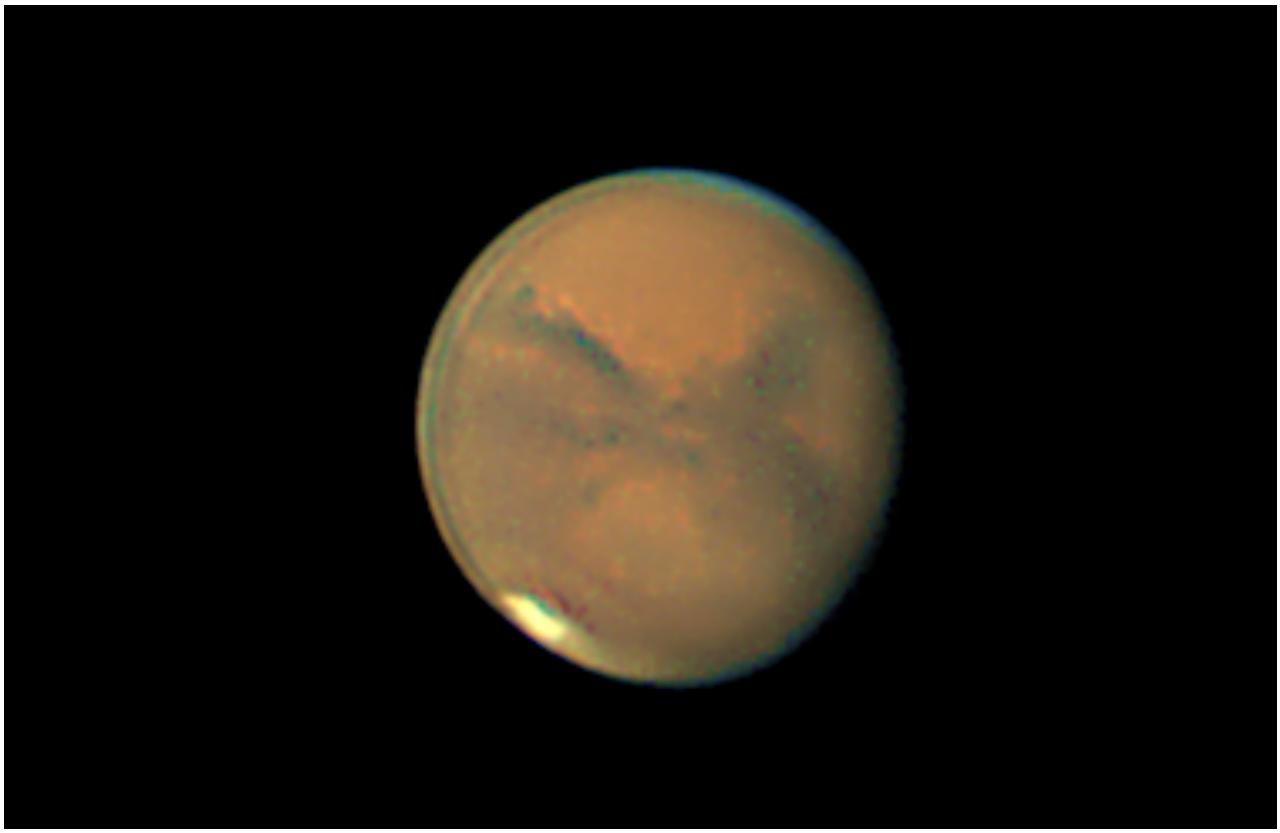
October, 2020

PO Box 591 Lowell, OR 97452 www.eugeneastro.org



Mars [1] Jeff Phillips

President: Andrew Edelen 618-457-3331

Secretary: Randy Beiderwell 541-342-4686

Board Members:

Oggie Golub

Jim Murray

Ken Martin

Jerry Oltion

EAS is a proud member of The Astronomical League.

- Our PO Box has changed!
PO Box 591
Lowell, OR 97452

Annual Club Dues $25

October Meeting - Thursday, Oct. 15 7pm

PLEASE NOTE THAT ALL MEETINGS ARE CURRENTLY VIRTUAL

TO BE ANNOUNCED.

We have had some terrific virtual meetings the last few months, thanks to all who have worked to make it happen!

Newsletter Update

The newsletter is under new editorship: Jerry Oltion is stepping back from this responsibility and I have volunteered to do my best to fill his shoes.

Jerry has been doing this for a long time, and I only hope I can come close to providing a newsletter as useful and interesting as Jerry has been doing for all these years. I am grateful for the opportunity and hope that you will forgive me as I get my feet under me and figure out how to make all the pieces work together.

I can't tell you how much I appreciate all that Jerry has done. I've been going back through the newsletters of the past and learned so much about the work he's put into them.

My name is Bruce Sackett. I've only been a current member for a few months now, joining up just as our meetings were virtualized due to the COVID-19 crisis. I was a member and club president 25 or so years ago and have many fond memories of that time as well.

I would be grateful for any and all submissions by you, the members, for this newsletter. Observing reports, favorite subjects, funny stories of star parties, photos, sketches, equipment notes or reviews, anything that you believe would be of interest to club members, I'll take them all!

As a side note, this issue has been very fortunate to have multiple articles available! On the other hand, as I am getting used to all this, I will be adding more photos where possible and hope to return the 'Observing this month' section in the very near future. Please be patient while I learn.

Finally, thank you again Jerry, for all that you have done for the club and the newsletter.

Bruce Sackett

bruce@busymind.net

Our Motion Through Space

By Jerry Oltion

The EAS's Dan Rinnan wrote an article for the April 2020 issue of Sky & Telescope magazine in which he described all the various motions through space that he has been subjected to during his 76 years of life. He started with his speed around in a circle as the Earth spins on its axis (about a thousand miles an hour at the equator, zero at the poles), then added the motion of the Earth around the Sun, the motion of the Sun around the center of the Milky Way, the motion of the Milky Way toward the Andromeda Galaxy, the motion of our local cluster of galaxies toward the Virgo Cluster (our closest major concentration of galaxies), and the Virgo Cluster's motion toward the Great Attractor, which is the point in space toward which all the galaxy clusters near us seem to be heading at a breakneck pace.

One of the most surprising revelations in that article was that, after accounting for all these motions (most of which are dwarfed by our motion toward the Great Attractor), Dan had still only traveled about 7% of the distance to Alpha Centauri, our nearest star system beyond the Sun.

That latter figure is what truly boggled my mind. In 76 years, with speeds clocking in at 2.16 million kilometers per hour, he still hasn't gone even a significant fraction of the distance to the next star? I would have thought he'd traveled at least the width of the galaxy by then (the rest of the galaxy moving along, too, of course).

That's where my mind got tripped up by the scale of things. I envisioned the spinning of our galaxy and its motion toward the Andromeda Galaxy and all those other motions as being slow and stately, sure, but only with respect to their size. On the tiny human scale, those motions seem lightning fast, so my gut feeling was that we would have moved vast distances in our lifetimes.

Gut feelings are misleading when the scale of things becomes outrageously beyond our realm of experience. That realization has led me to what I'll call Oltion's rule of humility: Don't trust intuition when dealing with forces beyond your comprehension.

The speed of light is a key factor in all this. 300,000 kilometers per second is the fastest anything can move, and any object with mass has to move even slower than that (because it would take infinite energy to accelerate anything with mass all the way up to the speed of light). While 300,000 km/sec seems like a pretty good clip, on the cosmic scale of things it's a snail's pace.

Those of us who lived in the 1960s are familiar with what is perhaps humanity's most memorable demonstration of the speed of light. During the Apollo missions to the Moon, radio signals took 1.3 seconds to reach the astronauts and their response took another 1.3 seconds to make it back to Earth, resulting in an awkward 2.6-second delay between President Nixon's "This certainly has to be the most historic telephone call ever made from the White House" and Neil Armstrong's "Thank you, Mr. President. It's a great honor and a privilege for us to be here." All through the eight lunar missions (two orbital, six landing), we were reminded again and again of that delay, and why, until it was burned into our heads: The Moon is 1.3 seconds away even at the speed of light.

If these galaxies were cars, they would rust away to nothing before they could collide.

Credit for photo:
European Southern Observatory

Our Motion Through Space (continued)

And the Moon is the closest celestial body to Earth.

We learn in school (if we have a good school) that the Sun is eight light-minutes away. Kids play with the concept that the Sun could go out and we wouldn't know it until eight minutes later. But eight minutes is a fairly long time; it already doesn't seem quite real.

A more easily grasped sense of scale might come if you think about this next time you're viewing the Sun at sunset, or through a properly filtered solar telescope: It takes light 4.6 seconds to cross the width of the Sun. Count seconds while you imagine a light ray moving from side to side. "One…one thousand. Two…two thousand. Three…three thousand. Four…four thousand. Five…and now."

It's mind-boggling when you actually do it. In your mind's eye, you can watch that light beam crawl across the Sun, and it is indeed a crawl.

Signals to and from our rovers on Mars take anywhere from 3 minutes at closest approach to 22 minutes at farthest. Jupiter is, on average, 43 light-minutes away, but that varies from 35 minutes to 52 minutes depending upon where we and Jupiter are in our orbits. That led to an interesting problem, and to one of the first calculations of the speed of light.

Ever since Galileo spotted the four major moons of Jupiter, people have been watching their motions and calculating their orbits. We got some pretty good numbers when we measured from day to day, but when we used those numbers to predict the moons' positions months in advance, those predictions would grow farther and farther off the mark. Sometimes the predictions would be fast, and sometimes slow, which finally led Danish astronomer Ole Romer to realize that light had a finite speed. We were seeing the moons earlier or later than average depending on their distance.

In 2015 we got a sense of the scale of our solar system when the New Horizons probe flew past Pluto. The probe performed its entire mission on automatic because control signals would have taken 4.5 hours to reach it. It was well past Pluto by the time the first photos of the encounter reached us.

Our Motion Through Space (continued)

The Voyager probes, humanity's farthest-reaching probes to date, are now about 20 light-hours away from the Sun. They're just now crossing into interstellar space, so we can consider that the radius of the solar system. That means our solar system is about 40 light-hours across (ignoring the Oort cloud). Light itself, the fastest thing in the universe, takes almost two days to cross from one side of our solar system to the other.

Now here's the mind-boggling part: None of the motions that we make through the universe, not even our supercluster's motion toward the Great Attractor, happens at even a significant fraction of the speed of light. Even at 2.16 million kilometers per hour, the vector sum of our various velocities through space (0.2% of the speed of light), it takes us 20,000 hours, or 2.3 years, to cross the width of our solar system.

Take a dinner plate and draw some circles on it to represent the planets' orbits. Put the circles way down toward the center, and pepper the outer part with dots to represent the outer solar system. Set the plate on a shelf somewhere, and every now and then, say once a week, give it a tiny nudge. If your plate is 8.5 inches across (a standard Corelle plate) and you nudge it just a smidgen less than 1/16 of an inch per week, it will move its own diameter in about 2.3 years.

That's how fast we're moving through the Universe.

If you want to scale it up and get a feel for how that looks when you consider the whole Milky Way, think of the galaxy as stretching the entire length of the United States. That's how big it would be if the solar system was the size of your dinner plate. It takes 2.3 years for a galaxy the size of North America to move the width of the plate. Trees grow faster than that.

Consider the impending collision between the Andromeda Galaxy and the Milky Way. That's predicted to happen in about 4.5 billion years. Why so long when we're only 20 times the galaxies' diameters apart and moving straight toward one another? Because it takes years for either galaxy to cross the distance of one solar system, much less the distance from one star to another. At the speed of light it would take the Milky Way 100,000 years to cross its own diameter, and we're not moving anywhere near the speed of light. We're moving toward the Andromeda Galaxy at only 100 kilometers per second (0.03% lightspeed). That means it takes two minutes for us to cross the diameter of the Earth, which is a tiny, tiny, tiny dot in the vastness of the galaxy.

So that mental image most of us hold of galaxies swirling around like the foam on a cup of stirred hot chocolate, and colliding with each other like waves crashing on a shore, is, shall we say, a bit inaccurate. A better image would be of those galaxies stuck in amber…but even amber flows faster than a galaxy on that scale would move.

The new 8” f/6 Dobsonian and its unique rack and pinion focuser.

Credit for photos:
Jerry Oltion

Another Scope for the Lending Library

By Jerry Oltion

In February, along with the club’s new (to us) 20" Obsession, we were given an 8" f/6 Newtonian scope of uncertain manufacture. It was a blue fiberglass tube with homemade rings for mounting on an equatorial mount. Equatorially mounted Newtonians are a pain in the backside, so the scope sat unused through the spring and summer, but after several months of virus-enforced lockdown Jerry Oltion needed a project, so he built a Dobsonian base for the scope.

The scope came with an optical finder, but those are back-breakers and difficult to aim (ironic, isn’t it?), so Jerry swapped it out for a Telrad that the club had in storage. Loren Reimers donated a mounting base for the Telrad.

The focuser is unconventional. It’s a combination helical and rack and pinion design that has close-spaced threads that act as the rack in a more or less conventional rack and pinion focuser, but the threads double as the spiral for a helical focuser. You can get close with the rack and pinion, then twist the helical part for fine focus.

That extra focusing ability is nice, because the optics on this scope are superb. Stars come to crisp little points, and at high magnification you can see nearly perfect Airy disks, which is rare for commercial mirrors. This scope splits the double-double in Lyra with ease and provides high-contrast views of planets, the Moon, and just about everything else.

The scope comes with a 25mm plossl eyepiece for 50x, and a 10mm plossl eyepiece for 125x. It’s ready to go into our lending library, and ready go to out to someone in need of a good 8" Dobsonian.

Club Dues and Big Shoes

By Randy Beiderwell

First off I hope all EAS members and families are safe and healthy! 2020 as we all know has been a challenge for everyone. I know first-hand how hard it is to try to keep up with all that is going on around us. To add to that October is EAS Dues month. Dues run from October through September each year. To be a member in good standing and have the ability to vote for club officers and to check out items from our vast and ever expanding lending library, you must also be current on your dues. The great news is dues are still an amazing $25. What a bargain! For those of you who are new or did not know there are two types of memberships; Individual membership and family membership, both at the same low price. With individual membership, in addition to the above you also become a member of the Astronomical League and receive quarterly issues of their informative and educational Reflector magazine. Each individual member receives an issue and is also eligible to check out items from our lending library. Family memberships receive one copy of the Reflector and can also check out one item at a time from our lending library.

Please note with the change in Secretary/Treasurer positions our club mail box has also changed. Please take a moment to make a check out and mail it to the Eugene Astronomical Society or EAS, P.O. Box 591, Lowell, OR 97452.

I want to take a moment and send a huge thank you out to Jerry Oltion! Jerry has worked tirelessly, almost full time for the past 14+ years for our club. He has done so much to help make our club one of, if not the most awesome astronomical clubs in the country. He has worn so many club hats not to mention club T-shirts. When he asked for a break from his Secretary/Treasurer position, I agreed to step up and try to fill those big shoes. Jerry is being so supportive during our transition period and getting me up to speed on all the club matters that most do not even know we do. Please join me in support with a huge THANK YOU JERRY! If you have any club questions, concerns or just need info please do not hesitate to reach out to me. I will do my best to accommodate you however I can. My email is alpenglow-video@comcast.net. My phone is 541-342-4686. Stay safe, stay healthy!

Member Astrophotography in this issue

[1] Mars by Jeff Phillips

For this picture I used a C11 telescope with an external crayford focuser, a ZWO ADC, and a ZWO 178mc color camera. I used the external 2 speed focuser because the last little bit of focus is very critical. I used the ADC to correct for atmospheric dispersion, the atmosphere acts as a mild prism shifting red light down and blue light up. And the 178mc camera has small pixels so I did not need a barlow.

By using a small ROI (region of interest) I was able to shoot a video at 200 frames per second, 5ms exposure, and capture 48,000 frames in 4 minutes. I used Autostackert 3 to stack the best 10%, Registax 6 wavelets to sharpen the image, and Paint Shop Pro to adjust the color.

In this picture you can see the south polar ice cap, the Hellas basin, Syrtis Major, and the cloud hood above the north pole. The craters Huygens and Schiaparelli are also visible.