Star Gazer News

Newsletter of the Delmarva Stargazers

www.delmarvastargazers.org

From the Prez….

I always enjoy using my OP scope, which of course stands for Other People's. I never fail to learn something in conversation or see something that I might not have looked for myself. Joe Cain, Bill Ellis and I always enjoy sharing the view with each other at star parties. Along with sharing the view we have great conversations. It's always interesting comparing the same object through different types of scopes too.

One of my best nights was a few years ago when Tim Milligan still had his 18" dob. Tim is an accomplished star hopper, so I not only got to enjoy the great view through Tim's scope but I learned many new techniques that improved my ability to star hop to find objects.

If you have aperture fever but can't swing a monster scope yet, nothing works better than an OP. Tim now has a 24" and is always willing to let me take a peek. Don Surles is also in possession of a large aperture monster and has never turned me away. Of course if you've been at one of our star parties and have not climbed the ladder of Kent Blackwell's scope, you have missed some real entertainment.

You have to respect the OP scope and equipment and be mindful at all times it's not your stuff. You also need to know when is not a good time or you'll quickly become a bother. If I see a bunch of other people around I'll wait and come back later.

Someone who is working hard trying to locate a particular object or is working on their scope might not want to stop to let you look. I might stop by and see what's going on but if I feel like I'm interfering with their concentration I'll move on. If I know someone is on a particular mission that night I'll leave them be and won't intrude.

You might have guessed from the number of public programs I do, I like to share my scope too. So if you see me set up somewhere, please stop by and take a look. Our hobby is as much about camaraderie as anything. We're all about good people, good conversations and sharing the night sky.

Don't forget for our June meeting we'll have Sue French via Skype. This is sure to be a great meeting from Sky & Tel's Deep Sky Wonders columnist. Jerry

Outreach at Pittsville

Jerry Truitt

Friday April 15th was just a few days past a first quarter moon and I had scheduled an outreach with the Pittsville Maryland Library. Pittsville is just outside Salisbury, so it's about a two hour drive. The clear sky clock showed it as clear when I left at 1 PM but the weather was definitely shaky. I got to the library at 3 with the sun out. Since I was early I decided to get a bit to eat so I stopped by the Pittsville Dinette and grabbed a burger. The dinette had an article posted from a local paper about their reputation for making excellent Muskrat. While the Muskrat sounded, uh, interesting I stuck with the burger that day.

One of the things I had planned was a solar viewing program. Some local teachers joined in with some Sun Spotter scopes. The Sun was dynamic with a large prominence flaring out with a huge filament in the upper left quadrant (in the scope) and a water fountain type prominence in the lower right. There were also a few sun spots on the surface. Don Surles had warned me that the Lunt Solar Scope is difficult for the public to use, so I was anxious to give it a try.

My son Patrick stopped by with a friend Mark from his work at Navtrak in Salisbury. I was excited to show them the sun before the library actually opened up. They both had great difficulty seeing with the scope. After 10 minutes of working with them to teach them how to position themselves with the eyepiece, they finally were able to actually see

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Upcoming Events:

Meeting !	**May 3rd**	**7 PM**	**SHWC**
Observing !	**May 6th**	**Dusk**	**Equestrian Cntr**

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the sun. They could not find the prominences however.

With some more coaching, changing from the 26mm to a Nag 16mm and giving precise coordinates and descriptions of the features they found the lower prominence.

They both commented “that tiny thing”. Now to me this thing was huge, it looked like a geyser of solar plasma; I could also see several smaller flames near it. This again made me realize we are trained observers who know how to use an eye piece. We use not only our eyes but our brain too and are able to zoom in and concentrate our attention in a way the untrained cannot.

The clouds rolled in, so I was unable to try the solar scope with the public which is just as well. I now realize that the solar scope has some limits. First it is not suitable for young audiences, it is too difficult to observe through and the young have little chance of seeing anything of worth. Even with adults it is not suited for large groups as this is a scope that takes time to use and some training for people to be able to spot the features on the sun.

With the sky overcast only a few people showed up but Doug Hemmick and a friend stopped by, it’s always nice to see familiar faces. I gave a new presentation on the sun which was well received. I also had some of our meeting materials left over like ATLAS DVDs, posters and handouts and some James Webb coasters, stickers and info sheets which I gave to the library.

I told the people I would check my schedule and try to come down again with clear skies next time.

Campo del Cielo Meteorite(s)….

During our February meeting I proudly passed around my latest meteorite…a 7 pound iron/nickel lump from the Campo del Cielo fall in Argentina. After the meeting it struck me that I really didn’t know very much about the meteorite or the fall so here are the results of what I have learned since then.

The Campo del Cielo refers to a group of iron meteorites or to the area where they were found situated on the border between the provinces of Chaco and Santiago del Estero, 1,000 kilometers (620 mi) northwest of Buenos Aires, Argentina. The crater field covers an area of 3×20 kilometers and contains at least 26 craters, the largest being 115×91 meters. The craters' age is estimated as 4,000–5,000 years. The craters, containing iron masses, were reported in 1576, but were already well known to the aboriginal inhabitants of the area. The craters and the area around contain numerous fragments of an iron meteorite. The total weight of the pieces so far recovered exceeds 100 tonnes, making the meteorite the heaviest one ever recovered on Earth. The largest fragment, consisting of 37 tonnes, is the second heaviest single-piece meteorite recovered on Earth, after the Hoba meteorite.

The recent history of the meteorite goes something like this…

In 1576, the governor of a province in Northern Argentina commissioned the military to search for a huge mass of iron, which he had heard that Indians used for their weapons. The Indians claimed that the mass had fallen from the sky in a place they called Piguem Nonralta which the Spanish translated as Campo del Cielo ("Field of the Sky"). The expedition found a large mass of metal protruding out of the soil. They assumed it was an iron mine and brought back a few samples, which were described as being of unusual purity. The governor documented the expedition and deposited the report in the Archivo General de Indias in Seville, but it was quickly forgotten and later reports on that area merely repeated the Indian legends.   Apparently the Spanish preferred the gold of the Americas more than iron meteorites.

Following the legends, in 1774 don Bartolome Francisco de Maguna rediscovered the iron mass which he called el Meson de Fierro ("the Table of Iron"). Maguna thought the

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mass was the tip of an iron vein. The next expedition, led by Rubin de Celis in 1783, used explosives to clear the ground around the mass and found that it was probably a single stone. Celis estimated its mass as 15 tonnes and abandoned it as worthless. He himself did not believe that the stone had fallen from the sky and assumed that it had formed by a volcanic eruption. However, he sent the samples to the Royal Society of London and published his report in the Philosophical Transactions of the Royal Society. Those samples were later analyzed and found to contain 90% iron and 10% nickel and assigned to a meteoritic origin.

Did you notice the Motherland was no longer Spain? Later, many iron pieces were found in the area weighing from a few milligrams to 34 tonnes. A mass of about 1 tonne known as Otumpa was located in 1803. Its 634 kg part was brought in 1813 to Buenos Aires and later donated to the British Museum. Other large fragments are summarized in the table below. The mass called el Taco was originally 3070 kg, but the largest remaining fragment weighs 1998 kg.

The largest mass of 37 tonnes was located in 1969 at a depth of 5 m using a metal detector.[3] This stone, named El Chaco, is the second heaviest single-piece meteorite after the Hoba meteorite (Namibia) which weighs 60 tonnes. However, the total mass of the Campo del Cielo fragments found so far exceeds 60 tonnes, making it the heaviest meteorite ever recovered on Earth.

El Chaco and "The Robert Haag Incident"…. Yes, we have a gentleman in the USA known as "The Meteorite Man"…our own Robert Haag who locates and acquires meteorites from around the world. The 40.7 ton el Chaco must have had a magnetic affect on Brother Haag because in 1990 In 1990 a local Argentinean highway police officer foiled a plot by Robert Haag to steal El Chaco. The stone had already been moved out of the country, but was returned to Campo del Cielo and is now protected by a provincial law.

Haag was arrested, jailed in Argentina and charged with taking protected rocks.

Robert Haag claims he was set up by an Argentinian mineral dealer, who claimed it belonged only to the landowner which Haag was to pay a substantial sum. Haag left the jail and Argentina after paying bail. There is no mention of a trial…or what happened to the "bail" money.

So, the Campo del Cielo meteorites (remember each fragment is a meteorite) have been on Earth for approx 5000 years and only recently, in the 1900's, did they become desirable to collectors. One hundred years out of 5000…
Don…

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Cosmic Recount

by Dr. Tony Phillips

News Flash: The Census Bureau has found a way to save time and money. Just count the biggest people. For every NBA star like Shaquille O'Neal or Yao Ming, there are about a million ordinary citizens far below the rim. So count the Shaqs, multiply by a million, and the census is done.

Could the Bureau really get away with a scheme like that? Not likely. Yet this is just what astronomers have been doing for decades.

Astronomers are census-takers, too. They often have to estimate the number and type of stars in a distant galaxy. The problem is, when you look into the distant reaches of the cosmos, the only stars you can see are the biggest and brightest. There's no alternative. To figure out the total population, you count the supermassive Shaqs and multiply by some correction factor to estimate the number of little guys.

The correction factor astronomers use comes from a function called the "IMF"—short for "initial mass function." The initial mass function tells us the relative number of stars of different masses. For example, for every 20-solar-mass giant born in an interstellar cloud, there ought to be about 100 ordinary sun-like stars. This kind of ratio allows astronomers to conduct a census of all stars even when they can see only the behemoths.

Now for the *real* news flash: The initial mass function astronomers have been using for years might be wrong.

NASA's Galaxy Evolution Explorer, an ultraviolet space telescope dedicated to the study of galaxies, has found proof that small stars are more numerous than previously believed.

"Some of the standard assumptions that we've had—that the brightest stars tell you about the whole population—don't seem to work, at least not in a constant way," says Gerhardt R. Meurer who led the study as a research scientist at Johns Hopkins University, Baltimore, Md. (Meurer is now at the University of Western Australia.)

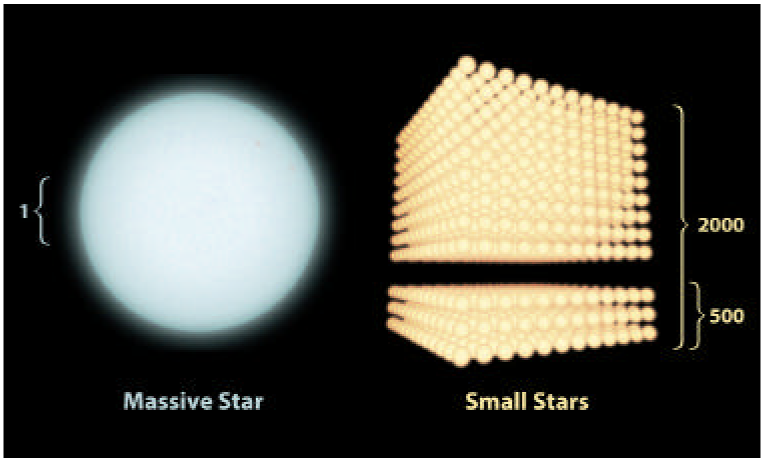
Meurer says that the discrepancy could be as high as a factor of four. In other words, the total mass of small stars in some galaxies could be four times greater than astronomers thought. Take that, Shaq!

The study relied on data from Galaxy Evolution Explorer to sense UV radiation from the smaller stars in distant galaxies, and data from telescopes at the Cerro Tololo Inter-American Observatory to sense the "H-alpha" (red light) signature of larger stars. Results apply mainly to galaxies where stars are newly forming, cautions Meurer.

"I think this is one of the more important results to come out of the Galaxy Evolution Explorer mission," he says. Indeed, astronomers might never count stars the same way again.

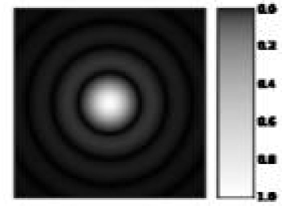
Find out about some of the other important discoveries of the Galaxy Evolution Explorer at http://www.galex.caltech.edu/. For an easy-to-understand answer for kids to "How many solar systems are in our galaxy?" go to The Space Place at: http://tiny.cc/I2KMa

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



Astronomers have recently found that some galaxies have as many as 2000 small stars for every 1 massive star. They used to think all galaxies had only about 500 small stars for every 1 massive star.

Airy and the Airy Disk.



We all have seen pictures of the Airy disk. The Airy disk and Airy pattern are descriptions of the best focused spot of light that a perfect lens with a circular aperture can make, limited by the diffraction of light. Some of us have seen it in our telescopes. Airy didn't discover this phenomenon, but it is named after him. Below is a brief summary of his career gleaned from:

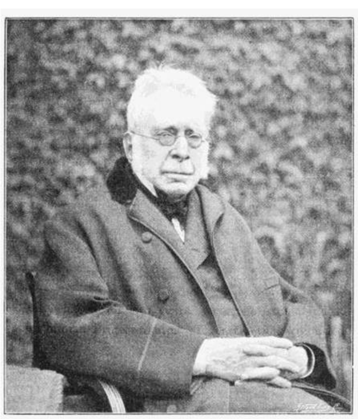
GREAT ASTRONOMERS (1895) by SIR ROBERT S. BALL

George Biddell Airy came to be born at Alnwick, on 27th July, 1801. The boy's education, so far as his school life was concerned was partly conducted at Hereford and partly at Colchester. He does not, however, seem to have derived much benefit from the hours which he passed in the school-room. But it was delightful to him to spend his holidays on the farm at Playford, where his uncle, Arthur Biddell, showed him much kindness. In spite of the defects of his school training he seems to have manifested such remarkable abilities that his uncle decided to enter him in Cambridge University. He accordingly joined Trinity College as a sizar in 1819, and after a brilliant career in mathematical and physical science he graduated as Senior Wrangler in 1823. In the year after he had taken his degree he was elected to a Fellowship at Trinity College.

One of his most interesting researches in these early days is on the subject of Astigmatism, which defect he had discovered in his own eyes. His investigations led him to suggest a means of correcting this defect by using a pair of spectacles with lenses so shaped as to counteract the derangement which the astigmatic eye impressed upon the rays of light. His researches on this subject were of a very complete character, and the principles he laid down are to the present day practically employed by oculists in the treatment of this malformation.

On the 7th of December, 1826, Airy was elected to the Lucasian Professorship of Mathematics in the University of Cambridge, the chair which Newton's occupancy had rendered so illustrious. His tenure of this office only lasted for two years, when he exchanged it for the Plumian Professorship(see Note). The attraction which led him to desire this change is doubtless to be found in the circumstance that the Plumian Professorship of Astronomy carried with it at that time the appointment of director of the new astronomical observatory, the origin of which must now be described.

Those most interested in the scientific side of University life decided in 1820 that it would be proper to found an astronomical observatory at Cambridge. Donations were accordingly sought for this purpose, and upwards of 6,000 pounds were contributed by members of the University and the public. To this sum 5,000 pounds were added by a grant from the University chest, and in 1824 further sums amounting altogether to 7,115 pounds were given by the University for the same object. The regulations as to the administration of the new observatory placed it under the management of the Plumian Professor, who was to be provided with two assistants. Their duties were to consist in making meridian observations of the sun, moon, and the stars, and the observations made each year were to be printed and published. The observatory was also to be used in the educational work of the University, for it was arranged that smaller instruments were to be provided by which students could be instructed in the practical art of making astronomical observations.



The building of the Cambridge Astronomical Observatory was completed in 1824, but in 1828, when Airy entered on the discharge of his duties as Director, the establishment was still far from completion, in so far as its organization was concerned. Airy commenced his work so energetically that in the next year after his appointment he was able to publish the first volume of "Cambridge Astronomical Observations," notwithstanding that every part of the work, from the making of observations to the revising of the proof-sheets, had to be done by himself.

Airy gradually added to the instruments with which the observatory was originally equipped. A mural circle was mounted in 1832, and in the same year a small equatorial was erected by Jones. This was made use of by Airy in a well-known series of observations of Jupiter's fourth satellite for the determination of the mass of the great planet. His memoir on this subject fully ex pounds the method of finding the weight of a planet from observations of the movements of a satellite by which the planet is attended. This is, indeed, a valuable investigation which no student of astronomy can afford to neglect. The ardour with which Airy devoted himself to astronomical studies may be gathered from a remarkable report on the progress of astronomy during the present century, which he communicated to the British As-

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sociation at its second meeting in 1832. In the early years of his life at Cambridge his most famous achievement was connected with a research in theoretical astronomy for which consummate mathematical power was required.

Airy proposed to himself to compute the effects which Venus would have on the movement of the earth in consequence of the circumstance that eight revolutions of the one planet required almost the same time as thirteen revolutions of the other. This is a mathematical inquiry of the most arduous description, but the Plumian Professor succeeded in working it out, and he had, accordingly, the gratification of announcing to the Royal Society that he had detected the influence which Venus was thus able to assert on the movement of our earth around the sun. This remarkable investigation gained for its author the gold medal of the Royal Astronomical Society in the year 1832.

In consequence of his numerous discoveries, Airy's scientific fame had become so well recognized that the Government awarded him a special pension, and in 1835, when Pond, who was then Astronomer Royal, resigned, Airy was offered the post at Greenwich. There was in truth, no scientific inducement to the Plumian Professor to leave the comparatively easy post he held at Cambridge, in which he had ample leisure to devote himself to those researches which specially interested him, and accept that of the much more arduous observatory at Greenwich. There were not even pecuniary inducements to make the change; however, he felt it to be his duty to accede to the request which the Government had made that he would take up the position which Pond had vacated, and accordingly Airy went to Greenwich as Astronomer Royal on October 1st, 1835.

The Astronomer Royal was a capable, practical engineer as well as an optician, and he presently occupied himself by designing astronomical instruments of improved pattern, which should replace the antiquated instruments he found in the observatory. In the course of years the entire equipment underwent a total transformation. He ordered a great meridian circle, every part of which may be said to have been formed from his own designs. He also designed the mounting for a fine equatorial telescope worked by a driving clock, which he had himself invented. Gradually the establishment at Greenwich waxed great under his incessant care. It was the custom for the observatory to be inspected every year by a board of visitors, whose chairman was the President of the Royal Society. At each annual visitation, held on the first Saturday in June, the visitors received a report from the Astronomer Royal, in which he set forth the business which had been accomplished during the past year. It was on these occasions that applications were made to the Admiralty, either for new instruments or for developing the work of the observatory in some other way. After the more official business of the inspection was over, the observatory was thrown open to visitors, and hundreds of people enjoyed on that day the privilege of seeing the national observatory. These annual gatherings are happily still continued, and the first Saturday in June is known to be the occasion of one of the most interesting reunions of scientific men which takes place in the course of the year.

Airy's scientific work was, however, by no means confined to the observatory. He interested himself largely in expeditions for the observation of eclipses and in projects for the measurement of arcs on the earth. He devoted much attention to the collection of magnetic observations from various parts of the world. Especially will it be remembered that the circumstances of the transits of Venus, which occurred in 1874 and in 1882, were investigated by him, and under his guidance expeditions were sent forth to observe the transits from those localities in remote parts of the earth where observations most suitable for the determination of the sun's distance from the earth could be obtained. The Astronomer Royal also studied tidal phenomena, and he rendered great service to the country in the restoration of the standards of length and weight which had been destroyed in the great fire at the House of Parliament in October, 1834. In the most practical scientific matters his advice was often sought, and was as cheerfully rendered. Now we find him engaged in an investigation of the irregularities of the compass in iron ships, with a view to remedying its defects; now we find him reporting on the best gauge for railways. Among the most generally useful developments of the observatory must be mentioned the telegraphic method for the distribution of exact time. By arrangement with the Post Office, the astronomers at Greenwich despatch each morning a signal from the observatory to London at ten o'clock precisely. By special apparatus, this signal is thence distributed automatically over the country, so as to enable the time to be known everywhere accurately to a single second. It was part of the same system that a time ball should be dropped daily at one o'clock at Deal, as well as at other places, for the purpose of enabling ship's chronometers to be regulated.

Airy's writings were most voluminous, and no fewer than forty-eight memoirs by him are mentioned in the "Catalogue of Scientific Memoirs," published by the Royal Society up to the year 1873, and this only included ten years out of an entire life of most extraordinary activity. Many other subjects besides those of a purely scientific character from time to time engaged his attention. He wrote, for instance, a very interesting treatise on the Roman invasion of Britain, especially with a view of determining the port from which Caesar set forth from Gaul, and the point at which he landed on the British coast. Airy was doubtless led to this investigation by his study of the tidal phenomena in the Straits of Dover. Perhaps the Astronomer Royal is best known to the general reading public by his excellent lectures on astronomy, delivered at the Ipswich Museum in 1848.

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Dark Skys

Pj Riley

Some Astronomers have fancy light meters to tell them when the sky is at a certain 'darkness' level.

Below is a table developed by John E. Bortle in 2001 to give us an easy scale to describe the sky your observing.

So, email me at dmsg_pjr@yahoo.com and tell me how dark you thought the sky was during Stargaze.

Class	Title	Color key	Naked-eye Limit	Stellar	Description
1	Excellent dark-sky site	black	7.6–8.0	19 at best	Zodiacal light band visible; M33 direct vision naked-eye object; Scorpius and Sagittarius regions of the Milky Way cast obvious shadows on the ground; airglow is readily visible; Jupiter and Venus affect dark adaptation; surroundings basically invisible.
2	Typical truly dark site	gray	7.1–7.5	17 at best	M33 easily seen naked eye; highly structured summer Milky Way; distinctly yellowish zodiacal light bright enough to cast shadows at dusk and dawn; clouds only visible as dark holes; surroundings still only barely visible silhouetted against the sky; many Messier globular clusters still distinct naked-eye objects.
3	Rural sky	blue	6.6–7.0	16 at best	Some light pollution evident at the horizon; clouds illuminated near horizon, dark overhead; Milky Way still appears complex; M15, M4, M5, and M22 distinct naked-eye objects; M33 easily visible with averted vision; zodiacal light striking in spring and autumn, color still visible; nearer surroundings vaguely visible.
4	Rural/suburban transition	yellow	6.1–6.5	15.5 at best	Light pollution domes visible in various directions over the horizon; zodiacal light is still visible, but not even halfway extending to the zenith at dusk or dawn; Milky Way above the horizon still impressive, but lacks most of the finer details; M33 a difficult averted vision object, only visible when higher than 55°; clouds illuminated in the directions of the light sources, but still dark overhead; surroundings clearly visible, even at a distance.
5	Suburban sky	orange	5.6–6.0	15 at best	Only hints of zodiacal light are seen on the best nights in autumn and spring; Milky Way is very weak or invisible near the horizon and looks washed out overhead; light sources visible in most, if not all, directions; clouds are noticeably brighter than the sky.
6	Bright suburban sky	red	5.1–5.5	14.5 at best	Zodiacal light is invisible; Milky Way only visible near the zenith; sky within 35° from the horizon glows grayish white; clouds anywhere in the sky appear fairly bright; surroundings easily visible; M33 is impossible to see without at least binoculars, M31 is modestly apparent to the unaided eye.
7	Suburban/urban transition or Full Moon	red	4.6–5.0	14 at best	Entire sky has a grayish-white hue; strong light sources evident in all directions; Milky Way invisible; M31 and M44 may be glimpsed with the naked eye, but are very indistinct; clouds are brightly lit; even in moderate-sized telescopes the brightest Messier objects are only ghosts of their true selves. At a full moon night the sky is not better than this rating even at the darkest locations with the difference that the sky appears more blue than orangish white at otherwise dark locations.
8	City sky	white	4.1–4.5	13.5 at best	Sky glows white or orange—one can easily read; M31 and M44 are barely glimpsed by an experienced observer on good nights; even with telescope, only bright Messier objects can be detected; stars forming familiar constellation patterns may be weak or completely invisible.
9	Inner-city sky	white	4.0 at best	13 at best	Sky is brilliantly lit, with many stars forming constellations invisible and many weaker constellations invisible; aside from Pleiades, no Messier object is visible to the naked eye; only objects to provide fairly pleasant views are the Moon, the planets, and a few of the brightest star clusters.

Astrophotos by Members and Friends

This is a picture of The Whirlpool Galaxy or M 51 located in the constellation Canes Venatici. According to Wikipedia, " Decades ago, it was not known with certainty whether the companion galaxy NGC 5195 was a true companion, or another galaxy passing at a distance. The advent of radio astronomy and subsequent radio images of M51 unequivocally demonstrated the reality of the interaction."

This is a LRGB image with a little Ha data mixed in with the Red channel to show the star forming regions within the galaxy. It was taken with my 5" refractor.

Joe Morris

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This book has passed through many editions, and it gives a most admirable account of the manner in which the fundamental problems in astronomy have to be attacked.

As years rolled by almost every honour and distinction that could be conferred upon a scientific man was awarded to Sir George Airy. He was, indeed, the recipient of other honours not often awarded for scientific distinction. Among these we may mention that in 1875 he received the freedom of the City of London, "as a recognition of his indefatigable labours in astronomy, and of his eminent services in the advancement of practical science, whereby he has so materially benefited the cause of commerce and civilisation."

Until his eightieth year Airy continued to discharge his labours at Greenwich with unflagging energy. At last, on August 15th, 1881, he resigned the office which he had held so long with such distinction to himself and such benefit to his country. He had married in 1830 the daughter of the Rev. Richard Smith, of Edensor. Lady Airy died in 1875, and three sons and three daughters survived him. One daughter is the wife of Dr. Routh, of Cambridge, and his other daughters were the constant companions of their father during the declining years of his life. Up to the age of ninety he enjoyed perfect physical health, but an accidental fall which then occurred was attended with serious results. He died on Saturday, January 2nd, 1892, and was buried in the churchyard at Playford.

Note.

The Plumian chair of Astronomy and Experimental Philosophy is one of the two major Professorships in Astronomy at Cambridge University, alongside the Lowndean Professorship. The chair is currently held at the Institute of Astronomy in the University. The Plumian chair was founded in 1704 by Thomas Plume, a member of Christ's and Archdeacon of Rochester, to "erect an Observatory and to maintain a studious and learned Professor of Astronomy and Experimental Philosophy, and to buy him and his successors utensils and instruments quadrants telescopes etc."

The first Professorship was awarded in 1707 to Roger Cotes, a former student of Isaac Newton, and the stipend was increased in 1768 by Dr Robert Smith, the second Plumian Professor.

The Plumian Professors

Roger Cotes (1707–1716)	Robert Smith (1716–1760)	
Anthony Shepherd (1760–1796)	Samuel Vince (1796–1821)	
Robert Woodhouse (1822–1828)	George Airy (1828–1836)	
James Challis (1836–1883)	George Darwin (1883–1912) (Son of Charles Darwin)	
Arthur Eddington (1913–1944)	Harold Jeffreys (1946–1958)	
Fred Hoyle (1958–1972)	Martin Rees (1973–1991)	
Richard Ellis (1993–2000)	Jeremiah Ostriker (2001–2003)	Robert Kennicutt (2005–)

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