The High Desert Observer

The Bulletin of the Astronomical Society of Las Cruces

March, 2009

President's Message

March Madness is upon us but for amateur astronomers it has nothing to do with basketball. No, it is time for the marathon and this marathon has nothing to do with running, unless you include running around in the dark trying to put an eye on that illusive Messier object. Yes, that's right, it is time for the Messier Marathon. A time when the most dedicated imagers pick up thier manual mounts, DOB or ALT AZ, dust off their eye pieces and try to improve thier old Messier Marathon record and knowledge of the night sky. It is a time to teach and learn and a time to get to know your fellow astronomers a bit better. It is a chance to spend a night or a portion of it enjoying the pristine dark sky we are so blessed to have so close by. It is a time to look up and see what you can see. The only people who do not win are those who don't participate. It is a night for visual astronomy. However, there are those dedicated few imagers who just cant see looking through an eye-piece. Perhaps they make a mad attempt to image all 110 Messier objects on one night. Don't know if that has ever been done. What a grand accomplishment that would be. Good luck, Rich!!!

The International Year of Astronomy is moving right along. We are trying to do our part and bring the heavens to the public. Kirby and Wes are working on an event to coincide with the 100 hours of astronomy that amateur and professional astronomers alike from around the world are putting together as a massive public outreach event.

The school star parties have been hitting us in waves faster and more closely grouped than we have been able to support. We have been showing students how to see through clouds (if they aren't too thick) and view the Moon or Venus. We have been searching for holes in the clouds to show some of the amazing objects in our night sky to children and their families. We had a great view of the Comet Lulin at the White Sands Elementary school on our third attempt.

The Texas Star Party is just around the corner and a large contingent of ASLC members will be representing us along with a group from El Paso. This is yet another opportunity to commiserate with your fellow astronomers. McDonald Observatory is providing a 36" observing session exclusively for TSP attendees, Wednesday night up on the mountain!

There is still a need for volunteers to give Star Talks at White Sands National Monument this coming summer. They are on Friday nights, when the moon does not interfere, and there are some nights you get clouded out. It seems a shame to not offer these to the public since the sky there is quite good, all things considered. If interested, please call Cathy Denton at White Sands (679-2599, ext, 231) to discuss it with her.

Your President and humble servant,

Jerry Gaber, 575-382-9183

The Astronomical Society of Las Cruces (ASLC) is dedicated to expanding members and public awareness and understanding of the wonders of the universe. ASLC holds frequent observing sessions and star parties, and provides opportunities to work on club and public educational projects. Members receive *The High Desert Observer*, our monthly newsletter, membership in the Astronomical League, including AL's quarterly *A.L. Reflector*. Club dues are $35 per year. Those opting to receive the ASLC newsletter electronically, receive a $5 membership discount. Send dues, payable to ASLC with an application form or a note to: Treasurer ASLC, PO Box 921, Las Cruces, NM 88004.

ASLC members are entitled to a $10 discount on subscriptions to *Sky and Telescope* magazine.

This Month's Observer

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Next Meeting

The next monthly meeting will be held March 27th at 7:30 pm in the usual place (Main Campus of the Dona Ana Community College, room 77). The speaker will be John Peterson. The topic will be "The History and Future of Planetariums."

The Imaging Group group will meet at 7:00 pm.

Events

The next monthly dark sky viewing night will be held on Saturday, March 28th at the Upham site. For these and other events, please see the ASLC website for further information:

http://www.aslc-nm.org.

April Issue of the *HDO*

Articles for the April issue should be sent to Tony Gondola by the 10th of the month. Text should be sent as email (*acgna@comcast.net*) or as an attached Microsoft Word document. Images should be sent in jpg format.

If you have any questions about submitting materials for publication in the *HDO*, please don't hesitate to contact me at 571-5118 or via email. Thanks in advance! Tony Gondola, Editor, ASLC Newsletter

February 2009 Meeting Minutes

Call to Order: Jerry Gaber, President, Astronomical Society of Las Cruces (ASLC), called the meeting to order at 7:30 pm., 27 February 2009, Rm. 77, Dona Ana Community College.

President's Comments: Jerry Gaber, Club President, welcomed the group and noted the new members and visitors present. Ron Kramer is a new member, having relocated to Las Cruces from South Carolina. Juan Muñoz and Juan Peña are visiting from Juarez, Mexico.

Secretary's Report: The minutes for the January meeting were submitted as published in the current issue of the Club newsletter, the *High Desert Observer* (*HDO*). Dave Dockery moved to accept the minutes as published, Vince Dovydaitis seconded. The minutes were accepted by acclamation of the members present. There was not an additional secretary's report.

Treasurer's Report: The president reported the balances of the Club's various accounts in the absence of the treasurer (arrived later). He also reported a mistaken charge for the Meade Solarscope is being resolved. There was no additional treasurer's report.

Observatory Committee: Rich Richins, Committee Chairman, reports there has been some progress regarding completion of the electrical drawings for submittal to the state. The electrical engineer would like to examine the proposed site at Leasburg Dam State Park before submitting the drawing package. Rich has attempted to contact the ranger at the park three times (thrice) so far with no success. He is still working his contacts with the park and may make several trips there in the near future with the engineer. There was no additional progress to report.

Old Business:

1. Club-logo Apparel – The last cap was sold but there are some t-shirts and polo shirts still available. A volunteer (Ron Kramer) is needed to take over this responsibility and put together a new order, including items to have on hand as new members join. Vince Dovydaitis made a motion to set aside $350 to maintain a stock of apparel on-hand. George Hatfield seconded. After discussion, the question was called and carried (with opposition) by the members present. Nils Allen will provide the information he has from last year's effort to Ron so he can proceed.

2. Meade Solarscope – Janet Stevens explained the credit card mischarge that created confusion regarding the telescope ordered in 2007. She believes this particular issue has been resolved, i.e., her account has been credited. She reported on her additional conversations with Meade's representatives and that the Club's telescope is next in line to start fabrication. The Club can expect a 60-90 day delay until shipment. Discussion ensued regarding whether the Club should continue to wait for the new telescope, look for a similar item (double-stack solarscope) on Internet sites such as Astromart, or revisit other vendors, such as Lundt (?). Dave Dockery made a motion to allow Steve Barkes to acquire a similar telescope on the "market" and inform Janet to cancel the Meade order. George Hatfield seconded. Additional discussion followed. It was pointed out that several Club members already own Personal Solar Telescopes (PSTs) by various manufacturers that are available for Club events including solar viewing, making it possible to wait until the Meade 'scope is shipped. Kirby Benson requested clarification of the differences between the double-stack telescope ordered and the single-stack items mostly available on-line. More discussion followed, including the possible issue of deterioration ("rust") of the telescope after five years or so.

The question was called and passed with opposition. The main form of opposition to the motion was willingness among those opposed to wait the additional 60-90 days for Meade to fill the order. Joseph Mancilla made a motion to amend the previous motion to not cancel the Meade order until a suitable alternative is available. Nils Allen seconded the motion. The amendment passed with opposition. The matter was closed.

New Business:

Star Parties – Chuck Sterling, Outreach Coordinator, will be in Albuquerque for several weeks and needs help supporting multiple star parties, including two on 03 March.

Wirt Atmar – Long-time active Club member and presentation recorder died of massive heart failure on 07 February. Condolences and regards to family. Need a volunteer (Tony Gondola) to contact family to investigate continuing posting to the AICS web site. It may be possible to provide a link from a page on the Club's web site as a memorial to Wirt's contributions to the Club. Tony will work on the system aspects. George Hatfield asked Rich Richins, web master, if archived presentations could be loaded on the Club site. Rich was concerned that the Club site did not have sufficient storage capacity for this. Jerry Gaber will contact the family and report to the membership.

100 Hours of Astronomy – This event is similar to last year's Super Moon Gaze and will be 02-05 April as part of IYA 2009. Wes Baker and Kirby Benson will coordinate the Club's efforts which will probably include multiple sites around town, preferably with Wi-Fi internet access to participate in the international events. A star party at the dedication of the new Bosque Park may also be included.

April 2009 meeting – The Board has decided to change the April meeting from 24 to 17 April to avoid conflict with the Texas Star Party (TSP).

Messier Marathon, 2009 - is the best opportunity in some time to view all 110 objects. Jerry Gaber would like to present certificates to participants and embroidered patches to those obtaining all 110. Ron Kramer will investigate obtaining the patches. Rich Richins will check on obtaining recognition pins and/or patches through SEDS.

John McCullough offered a motion to adjourn and Bert Stevens seconded. The motion passed and the business portion of the meeting was adjourned at 8:20 PM.

Announcements:

Adjustment Mechanism – Vince Dovydaitis has located the adjustment mechanism for the Grubb mount in the Club's observatory on the NMSU campus. Tony Gondola will work on installing it.

TSP 2009 – Dave Dockery reminded all potential participants to submit their registration applications and fees no later than 07 March.

Astronomy Picture of the Day (APoD) – An image of Comet Lulin by Rich Richins was recently selected as APoD.

Observations:

No observational reports were presented.

Presentation:

This month's program was presented in two parts. First, Club member Dave Dockery gave a presentation on Comet Lulin. He presented a number of recent images of the comet obtained by Rich Richins and him and explained why the tail(s) appear the way they do now and how they will evolve as the comet continues its journey around the Sun. He recommended visiting spaceweather.com for more information.

The second topic was presented by Club member Steve Barkes on the 6th Annual ASLC Messier Marathon for Fun and Profit. The Club has been holding Messier Marathons since 2004 with the goal of observing all 110 objects in a single night. The observing window for this year's Marathon is 23-30 March with the prime date on 28 March at the Upham DSO. Steve talked about the reasons to do a marathon, the goals, and how to prepare – gather resources, know your scope(s), and study your charts. Good luck to all!

These presentations were not recorded for rebroadcast on the Internet. Other meeting presentations can be accessed on the web at http://www.aicsresearch.com/lectures/aslcnm/.

The February 2009 monthly meeting concluded at 9:15 pm.

-Respectfully submitted by John McCullough, ASLC Secretary

March Meeting Presentation

John Peterson
The Gene Roddenberry Planetarium

John Peterson has been teaching in planetariums for over thirty years. He began his planetarium career at the Allentown Planetarium in Pennsylvania, ran the Clyde Tombaugh Planetarium in Alamogordo from 1981 to 1986, and has been the director of the Gene Roddenberry Planetarium in El Paso since then. His topic for the March 27th presentation to the Las Cruces Astronomy Club will be "The History and Future of Planetariums." From the earliest machines designed to reproduce the motions of the sky, to the invention of the first planetarium projectors, to the Spitz revolution and the construction of school planetariums in the 60s, to the future digital planetarium revolution, John will discuss the evolution of this important tool that has added so much to the field of astronomy education.

MTF Curves

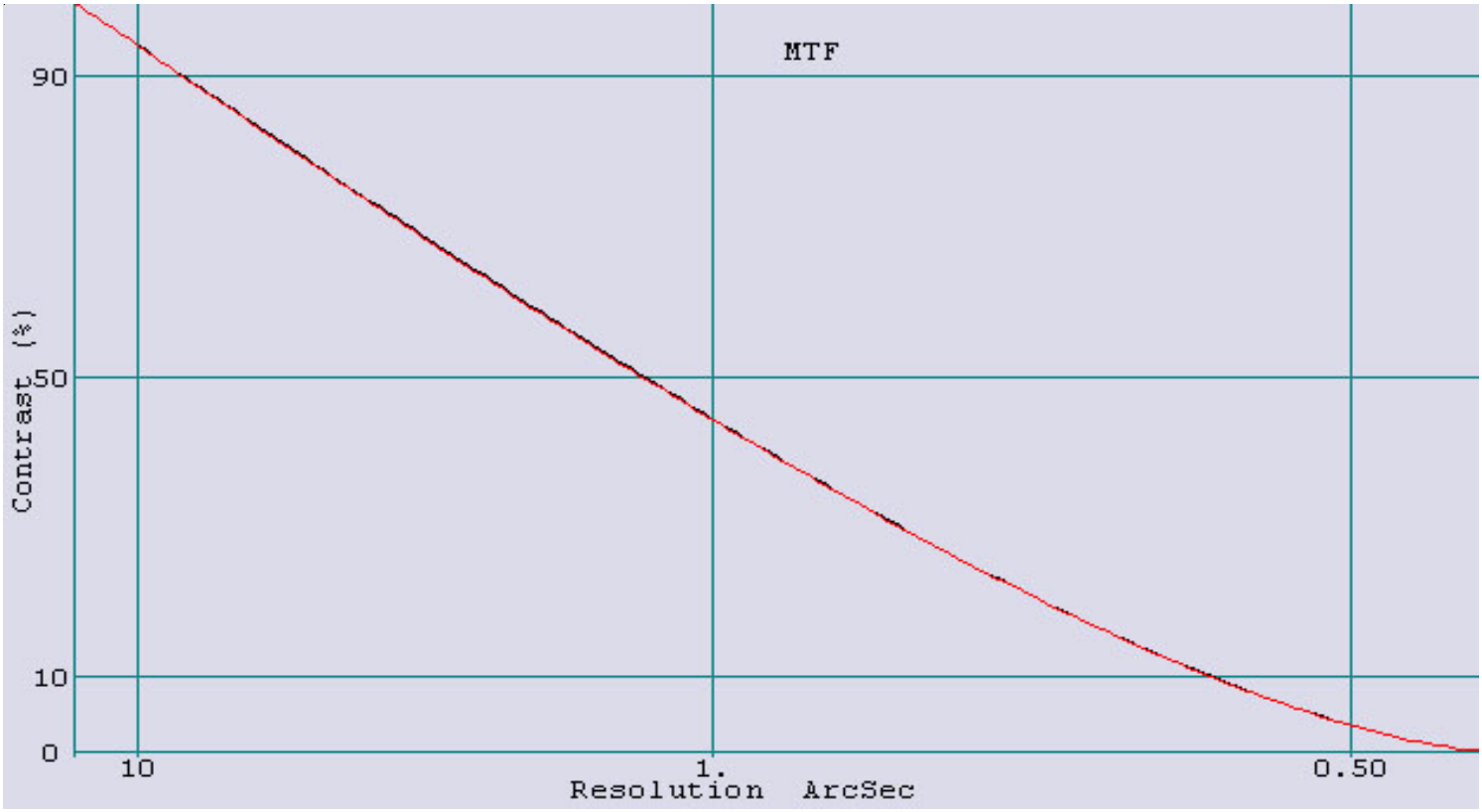
By Tony Gondola

Anyone who uses optical instruments that run the gamut from telescopes to microscopes to camera lenses has an interest and concern over the quality of the image they see or photograph. As telescope users we're all familiar with the common terms that are usually used to describe the performance of our instruments. Strehl ratios and wavefront ratings are the standard coin of the realm. As useful as this sort of data is in a comparative sense, it's just a number. It's difficult to make the translation to what will actually be seen at the eyepiece.

Enter the MTF curve. MTF is an acronym that stands for Modular Transfer Function. It's also sometimes called a CTF or Contrast Transfer Function. At first glance this might sound like an advanced topic of interest only to optical designers or crazy glass pushers like myself. In reality, it's one of the most unambiguous statements of actual optical performance that you're going to find. Once you understand MTF curves, the real world effects of things like obstructions and correction errors will no longer be a mystery or topics of unending debate.

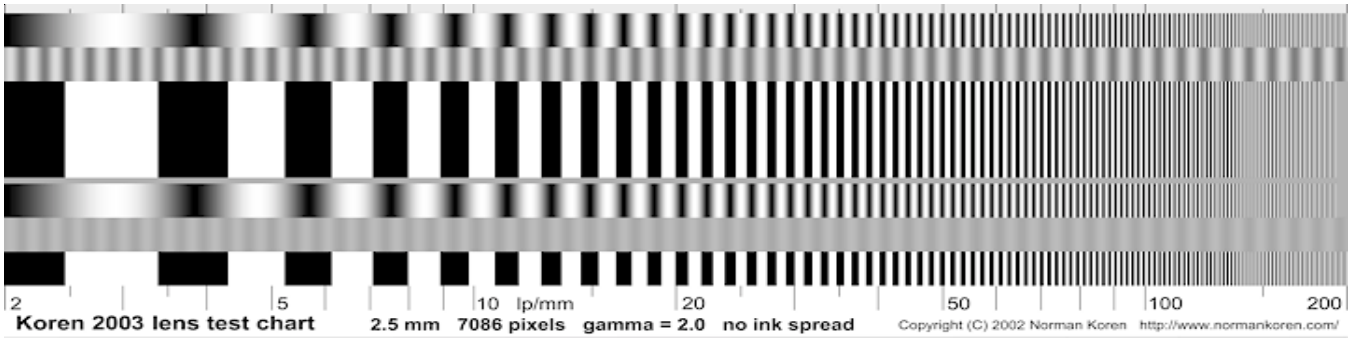
The basic concept is simple: every optical system is a filter. On the input side is the wavefront that enters your telescope from the distant object of interest. On the output side is the final image that's formed at the focal plane. The optical system sits in the middle, doing its job of gathering light and creating a magnified image. However, due to the physics of light and imperfections in its mirrors and lenses, information is lost. The measure of how much is lost is the very essence of the MTF curve.

With the above in mind, lets get stuck in and look at an actual MTF curve for a 10" F/6 unobstructed telescope, the so called "perfect" optical system:



The horizontal scale of the graph expresses resolution or special frequency. This is often shown in lines per millimeter but I've substituted angular spacing in arc/sec to make the result more meaningful. The vertical scale represents contrast. The curve shown is how much contrast is lost from reality at different special frequencies.

Imagine a white card printed with equally spaced black and white lines. Now imagine moving this card far enough away so that the angular distance from the center of one black line to the next is 10 arc/sec. If you then view the card through our "perfect" system you'll observe a contrast loss between the black and white lines of 5%. As you move the card farther away the angular separation between the lines will decrease, as will the contrast. The pure white lines will gradually darken and the solid black lines will lighten. Keep going far enough and you'll eventually reach a point where the contrast between the lines becomes zero.



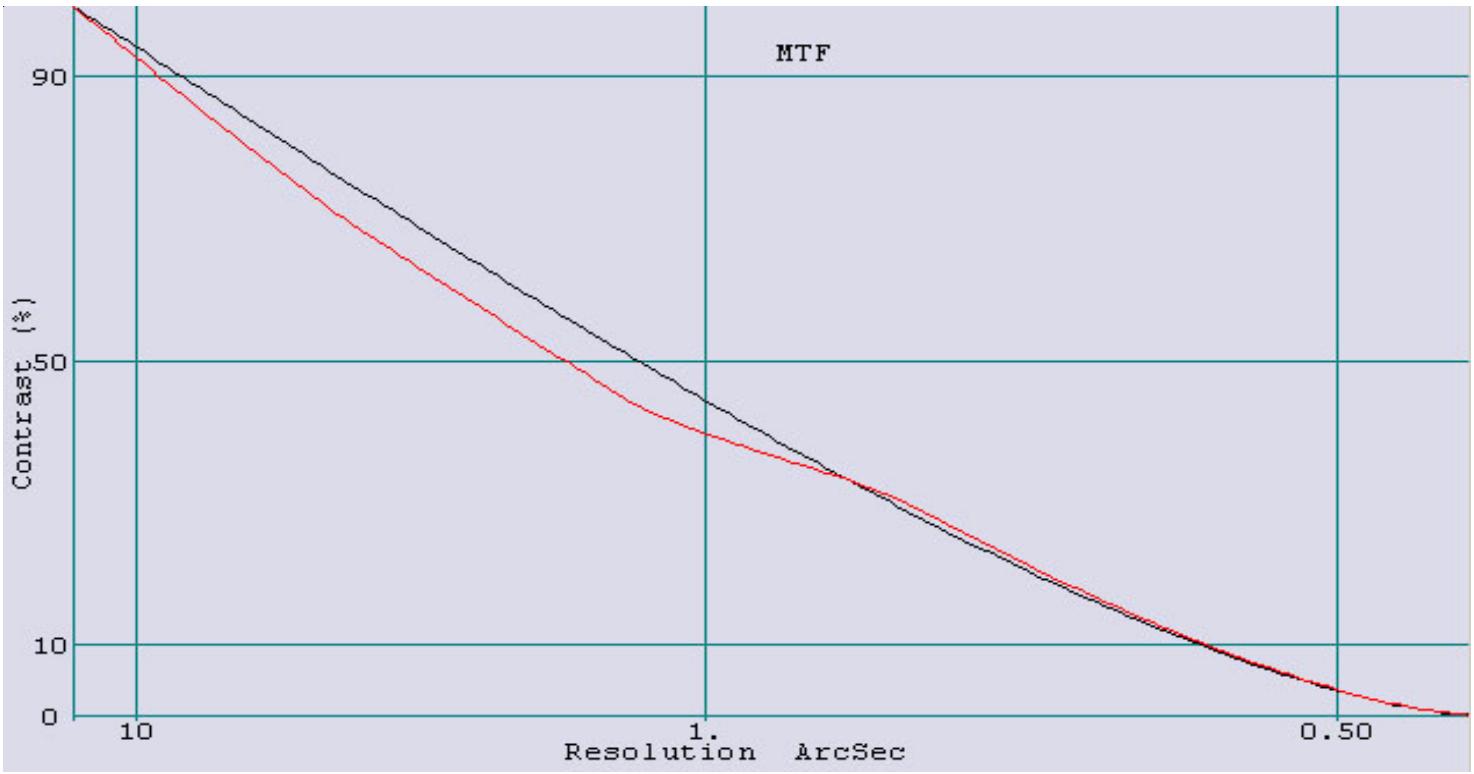
Typical LPM test chart

One important point to recognize is that once the angular separation between the lines becomes wide enough, contrast lost is very close to zero. Think about that for a moment because the curve directly describes what you experience visually with a telescope, as you go from low power to high.

Another point is how the curve neatly describes the actual resolution limit of the system. Notice that resolution drops below 5% at an angular separation of 0.5" arc/sec. 5% is the effective detection limit for the human eye when viewing high contrast detail. This corresponds very neatly with the Dawes limit of 0.46" arc/sec for a 10" system.

Now that we know how to read the curve we can use it to explore exactly how various common defects affect performance. One of the longest running debates in the amateur astronomy world is the impact of central obstructions. Since the vast majority of us use obstructed systems this is something to explore in detail and the MTF curve is the perfect tool for it.

Presented below is the curve for our standard 10" system with a 2" diameter (20%) central obstruction.

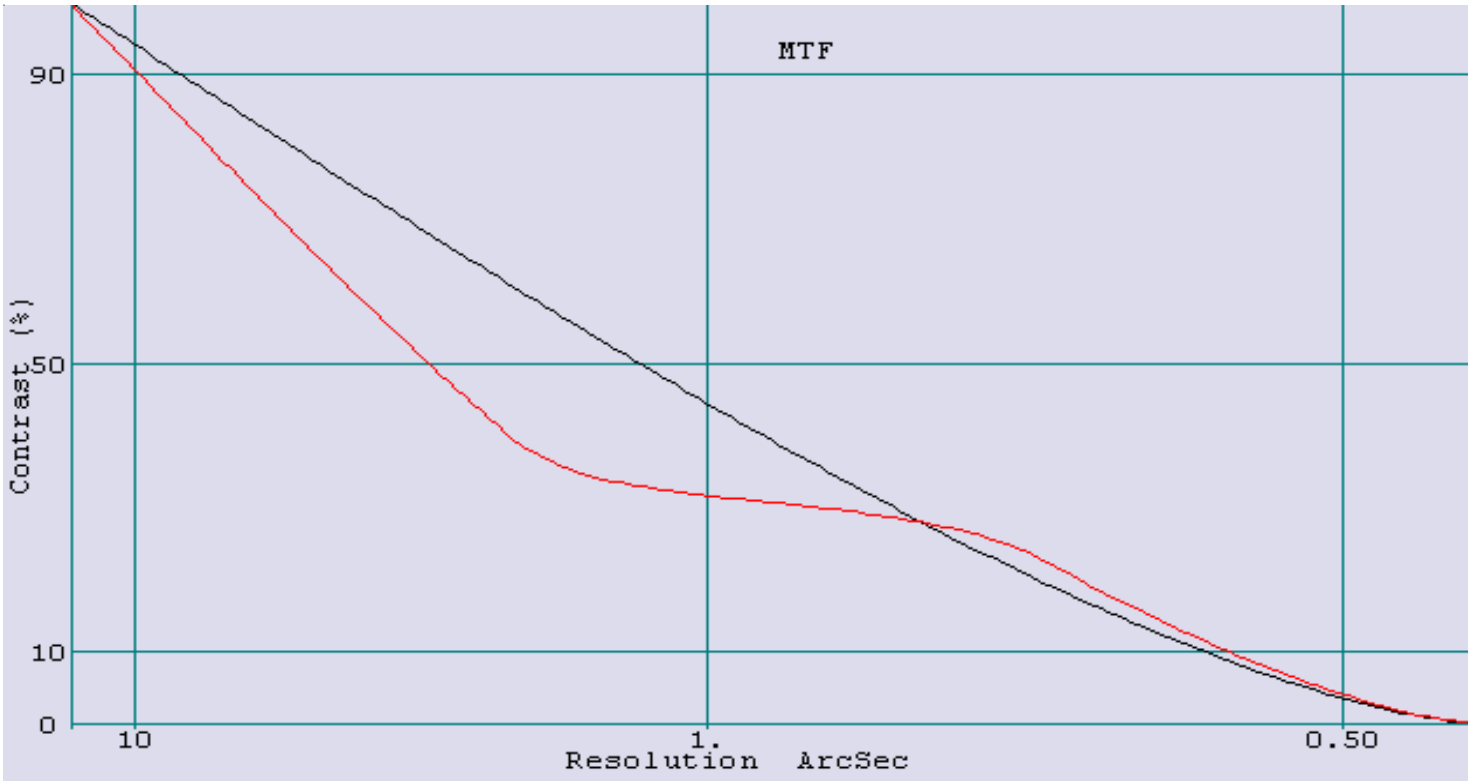


MTF curve 20 percent obstruction

The result is interesting, mainly because it's not what most people would predict. Again at wide angular separations the effect of the obstruction is near zero but it rapidly departs from the ideal as angular separation decreases below 10" arc/sec, reaching a maximum contrast loss of about 8% just above 1.0" arc/sec. This is enough to be noticeable visually, which explains why many people feel that any obstruction below 20% is acceptable for detailed work. It's also important to note that this resolution range is the most critical area for seeing low contrast planetary detail.

The most surprising part of the curve is what happens at angular separations below1.0" arc/sec. The obstruction actually improves the contrast for details closest to the resolution limit. The contrast boost really isn't nearly enough to be visible but it does explain why instruments that have rather large obstructions can still do fine work when it comes to splitting double stars and resolving the finest lunar details.

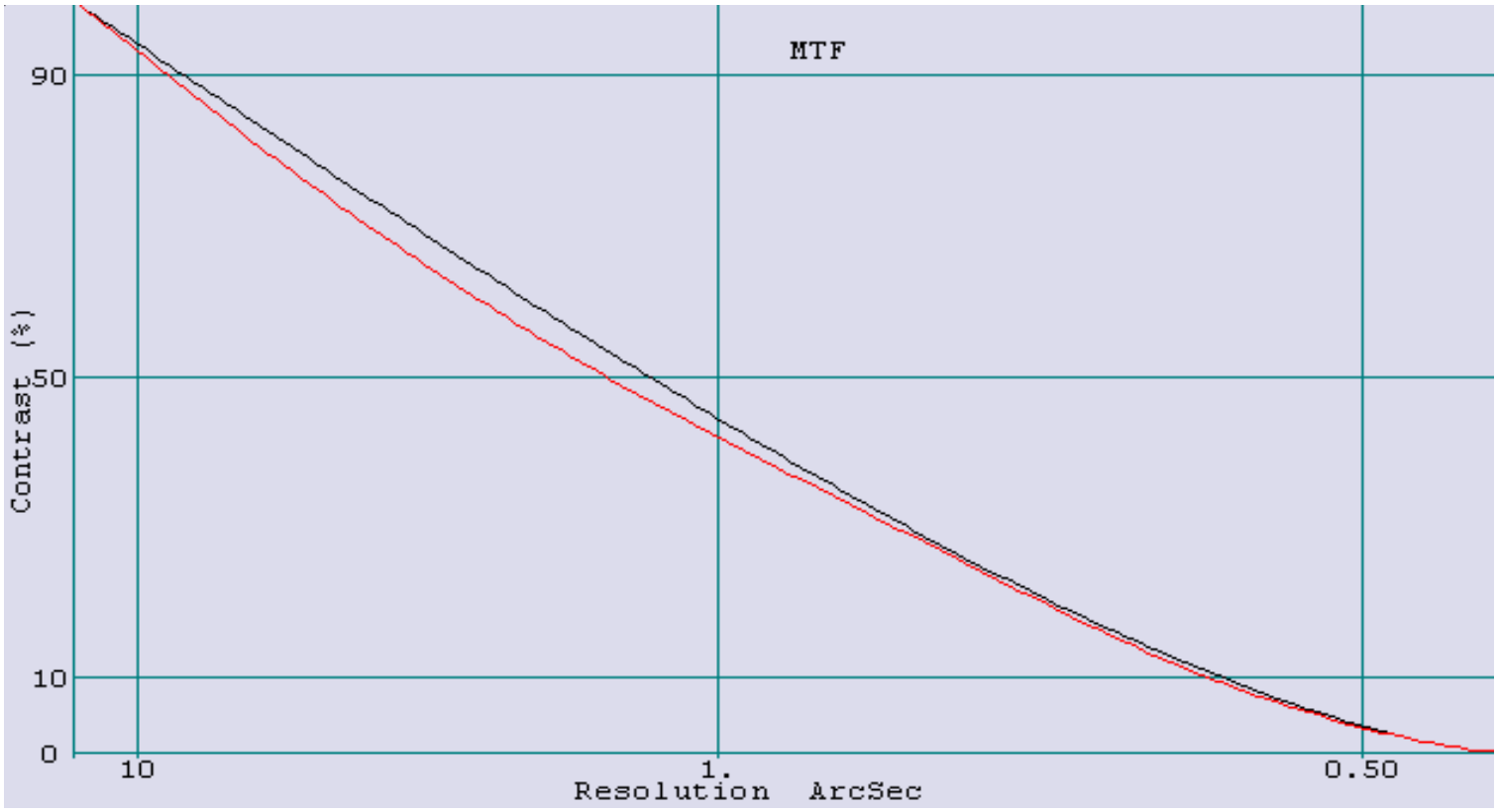
Now let's look at a curve that emulates a commercial SCT with a 37% obstruction.



MTF curve 37 percent obstruction

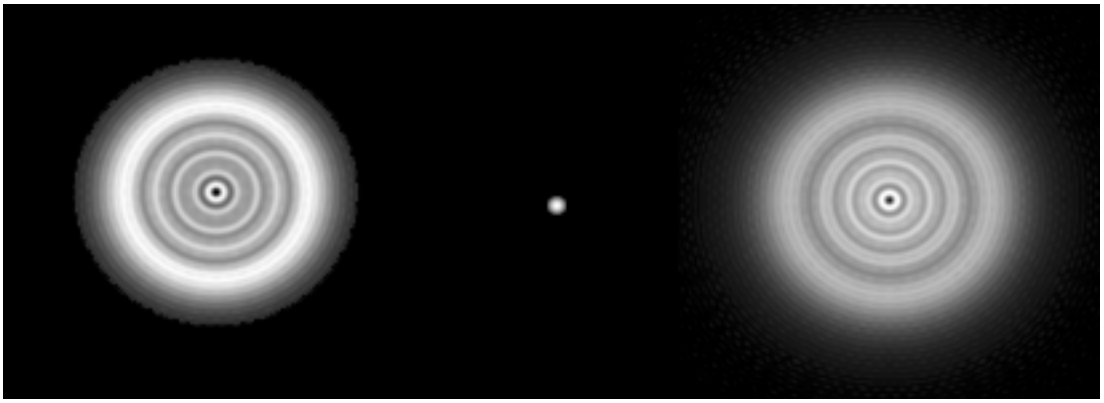
Now the effect really becomes rather dramatic. The loss of contrast at angular resolutions below 10" arc/sec becomes severe. The contrast loss rises to 20% at separations of a few arc/sec, greatly diminishing planetary detail, an effect that is very noticeable at this percentage of obstruction. The general effect noted by observers is a loss of color and fine detail. The contrast loss enters the noticeable visual range not much below 10" arc/sec. At that image scale the effect is noticeable even with medium power viewing of extended deep sky objects. Also, as we saw with the 20% obstruction, contrast is enhanced for details under 1" arc/sec., doing a little better than the original “perfect” system we started with.

MTF curves can also be used to model other optical defects such as over or under correction, a common defect in many optical systems. Let’s again take our model 10" F/6 system and give it a realistic amount of over correction, in this case, 10 percent. Here’s the impact on our otherwise perfect system.



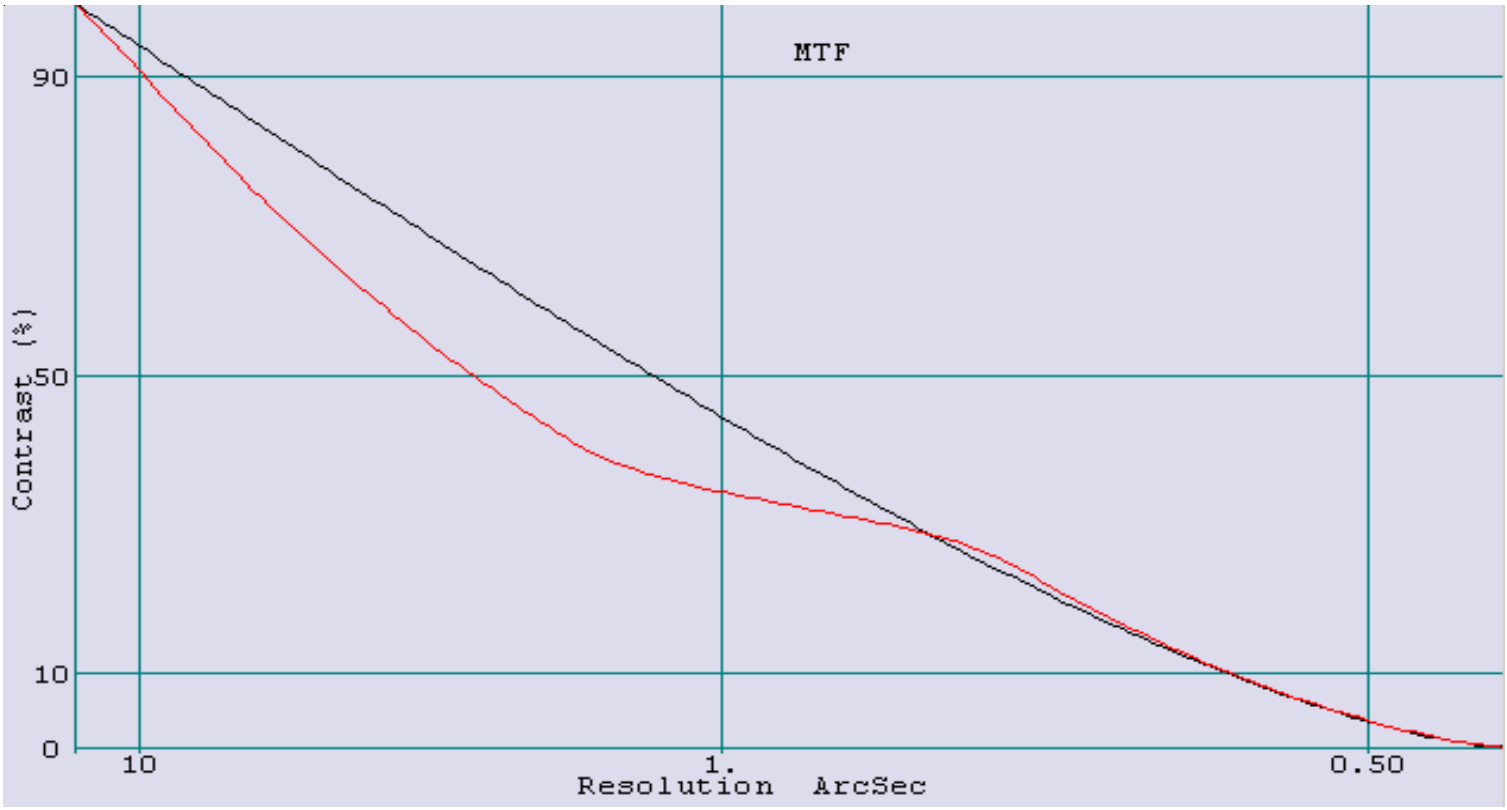
10 percent correction error

The contrast loss in this case is about 5% at maximum so the visual effect would be just noticable. Notice that unlike the effect of obstruction, correction errors result in a loss of contrast along the entire curve although the effect is small at the fine detail end of the curve. It's also worth noting that if you were to star test this system, the under correction would be obvious even though the Strehl ratio is still a reasonable 0.90.



10 percentcorrection error star test

Another useful application of the MTF curve is the modeling of the effects of multiple defects. In this case, let's look at the effect of a 30 percent obstruction in combination with 10 percent under correction.



30 percent obstruction plus 10 percent correction error

Here you can see how defects can really start to stack up on you. Maximum contrast loss is on the order of 12% which is a significant amount. Keep in mind that other than the obstruction and correction error, every other aspect of the system is perfect and spider diffraction effects are not included in the analysis. This points out the folly of accepting various aspects of a telescope design as "good enough." Taken alone, tha might be but what matters is the performance of the overall system. Every part of the telescope needs to be looked at in terms of its additive impact on image quality. A rough secondary, less then optimal mirror mount or uncontrolled thermal effects could be just enough to push a marginal system over the edge.

The Two Tales of Comet Lulin

NASA's Astronomy Picture o the Day for February 25th, 2009

Congradulations Rich Richins!

ASTRONOMICAL SOCIETY of Las Cruces
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ASLC - Sharing the Universe
With Our Community
for Over 50 Years