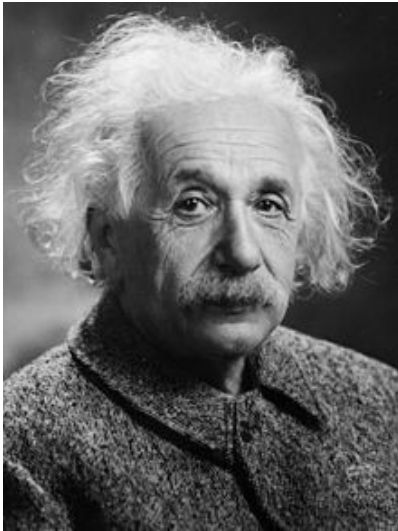


Dice, God, Quantum Mechanics and the German language.

By Dave Snyder



Albert Einstein Image added by
Editor from Wikipedia

You may have heard that Albert Einstein didn't like Quantum Mechanics and expressed this with the statement "God does not play dice."

Did Einstein say this? Yes, he did. However, when we say "Einstein said x" we usually mean "Einstein was the first to say x." He was not the first to use these exact words in connection with Quantum Mechanics. But this requires some explanation. (I learned part of this story years ago but only fleshed it out recently.)

First of all, I need to correct a common misconception. Einstein had no problem with Quantum Mechanics per se. He was very impressed with the equations of Quantum Mechanics (QM for short) and how these equations made extremely accurate predictions. His problem was with how QM was *interpreted*. In particular, he hated the Copenhagen Interpretation, the most common interpretation of QM and one that depicts an underlying randomness that conflicted with his view of the universe.

Einstein was close friends with many prominent scientists, including those involved in the development of Quantum Mechanics. One of these friends was Max Born, a key contributor to QM. Max Born hadn't received the recognition that other QM contributors had, such as Schrödinger or Heisenberg. Einstein was aware of this and was very sympathetic. Born eventually received the recognition he deserved, but it took a

long time. Heisenberg received a Nobel prize in Physics in 1932, Schrödinger in 1933. But Max Born had to wait until 1954 to receive his Nobel Prize. Einstein and Born corresponded, and many of the letters survive. The letters usually focused on personal matters, but often delved into science.

One of these letters contains the following text:

Die Quantenmechanik ist sehr achtungsgebietend. Aber eine innere Stimme sagt mir, daß das doch nicht der wahre Jakob ist. Die Theorie liefert viel, aber dem Geheimnis des Alten bringt sie uns kaum näher. Jedenfalls bin ich überzeugt, daß der nicht würfelt.

This is of course in German. I learned German while working on my bachelor's degree, this included a course called "Scientific German." The assignments required me to translate scientific journal articles written in German into English. However, that was four decades ago, and I haven't had much practice since. My German is rusty.

To translate those four sentences into English, I needed some help. There is a translation. Max Born's daughter, the late Irene Born, translated the letters from Einstein. I could have just used her translation, but that would have been too easy. I decided to produce my own translation starting with Irene's and the output from Google Translate. What I did not do is blindly accept either one, rather I merged them and worked on individual words until I was satisfied.

So here is my translation:

Quantum mechanics is very impressive and commands respect. But an inner voice tells me it's not yet the real McCoy. The theory says a lot, but it hardly brings us closer to the secret of the old one. I, at any rate, am convinced that he does not play dice.

I want to point out three things. First, many German words are formed from shorter words. “Achtunggebietend” is formed from “Achtung” and “gebietend.” “Achtung” may be familiar to you; you may have heard this word if you have watched a movie or TV show set during World War II. With all due respect to Irene Born, I was suspicious of her translation of the longer word. I was also suspicious of Google and other translations I had seen, so I spent more time on it. Google translates “Achtung” as “danger,” but it can also be translated as “respect” or “attention” (see references for more details). If you assume Achtung is used in the sense of respect, it leads to the translation of the longer word, and the translation of the surrounding sentence. Based on my knowledge of Einstein’s attitudes, I translated “ist sehr achtunggebietend” as “is very impressive and commands respect.”

Secondly, the phrase “der wahre Jakob” literally translates as “the true Jacob.” This is a German idiom which is roughly equivalent to the English “the real McCoy.”

Thirdly, “des Alten” which literally translates as “the old man,” but Irene translated as “the old one,” was often assumed to be a reference to God.

It doesn’t take much effort to shorten all four sentences to “God does not play dice” (whether someone is starting with the original German or a translation). However, I think something is lost when this is done.

Soon after the contents of the letter became public, the phrase “God does not play dice” or slight variations thereof found its way into printed documents. Each time this happened, the phrase was attributed to Einstein. Initially this was without Einstein’s knowledge or approval, but he heard about it, decided that he liked the phrase and started using it himself.

Max Born was more than a little irritated with Einstein. Years later, Max Born wrote the following with respect to the letter discussed above:

Einstein's verdict on quantum mechanics came as a hard blow to me: he rejected it not for any definitive reason, but rather by referring to an ‘inner voice’. This rejection plays an important part in later letters. It was based on a basic difference of philosophical attitude, which separated Einstein from the younger generation to which I felt that I belonged, although I was only a few years younger than Einstein.

Max Born was not the only scientist Einstein talked with. Among others, he famously had discussions with Niels Bohr. There is the claim that after one such discussion, Bohr responded with “Stop telling God what to do with his dice.” There is also a claim that Enrico Fermi made a similar comment. While this sounds like something Bohr or Fermi might have said, it is questionable whether either of them actually said it.

I have other examples of Einstein quotes; I might write about them in a future article.

References

The Born-Einstein Letters. Correspondence between Albert Einstein and Max and Hedwig Born from 1916 to 1955 with commentaries by Max Born. Translated by Irene Born. London, Macmillan, 1970, p. 91.

Irene Born’s English translation of the complete letter can be found on this page. Max Born’s comment was quoted verbatim from this page.

Wikiquote. “Albert Einstein” https://en.wikiquote.org/wiki/Albert_Einstein

Wikiquote. “Niels Bohr” https://en.wikiquote.org/wiki/Niels_Bohr

Youtube. “Hogan's Heroes - The Meaning Of Achtung.” <https://www.youtube.com/watch?v=ksmuG8z5zAY>

If you are still unsure what “Achtung” means, you will find this short video clip educational. In this video, Achtung is used in the sense of “respect” and/or “attention” and is essentially shorthand for the command “Respect me and give me your full attention.” But the word “Achtung” is more concise and has a harsher tone than that. Of course, in the video one of the characters is using the word correctly, the others are just being silly. The others no doubt knew what the word meant but willfully ignored both the “respect” and “attention” aspects of the word. Einstein was using the word in the sense of “respect” in his letter to Max Born, Einstein clearly respected Quantum Mechanics.

2020 Year in Review

(By Fearless Leader)

Charlie Nielsen

The year 2020 will go down as one of our most memorable ever...but largely not for good reasons. Early in the year a nasty little critter called Covid-19 arrived in the United States and quickly spread. This was a new virus and more deadly and with more long term complications than influenza. We had no vaccine and there were many unknowns. Therefore, starting in March, our state and others imposed many restrictive measures to try to hold down the spread. We were under a "stay at home" order, which meant we had to cancel our March meeting as well as all open houses and all other events until the situation improved. I think many of us were hopeful that toward the end of Summer or maybe Fall we would be able to start getting back to normal. But this was not the case, and even as I write this article, nearly a year later, we are still struggling mightily with this virus. At least now we have vaccines, but we are in a race against time because the virus has mutated several times and could mutate such that the vaccine is not effective.

I always try to find an upside to every situation and I guess in this case it is that it makes this article shorter to write since we had no open houses or events to write about. But hold on there...the Lowbrows will not be totally stopped. We carried on with meetings after March, but did so via Zoom. We also managed to hold our biggest event of the year, Astronomy At The Beach. Details on that later in this article.

Although we never used the McMath telescope and the observatory, Jack Brisbin got a crew together to finish the repainting project. Now the metal and the cement parts are repainted, and very nice looking. No doubt we all look forward to when we can enjoy it as we approach the building to set up for an open house! Another bit of progress was that in the late fall the road up the hill finally got repaired. This was much delayed and would have been a serious issue. But now when we can finally drive up the road for a night of observing or an open house, we should not have to worry about evading multiple mini grand canyons.

We continued holding our monthly meetings in G115 Angell Hall, but this year it was only for January and February. Covid-19 Pandemic restrictions occurred in March and prevented us from being able to hold that month's meeting. The officers decided that the show must go on, so we had to go on-line. We were assisted greatly by Jeff Kopmanis and we use his U of M Zoom account. This experience caused the officers and many club members to realize that even after we emerge from the pandemic, we should be allowing online access and/or You Tube broadcasting even during in-person meetings. The officers also realized the benefit of having someone that could find the time to perform the specialized tasks this requires. Therefore we created a new officer position called "Online Coordinator", and Jeff fit the job description perfectly! This brings us to a second problem the pandemic caused for us. Our first online meeting was in April, but the club's By-laws state that we must vote for officers in person at our April meeting. So we asked the membership if we should just carry on with the current group of officers until we could write into the By-laws a mechanism for expanded officer voting; and/or until the next April meeting. No one objected. Since we needed to do this and create that new officer position we took the opportunity to tweak some other areas that needed updating. Many of those were necessary anyway because they were items inter-twinned with the new voting mechanisms. In the second half of the year the club approved the amendments and we will be testing the new methods this April. We also nominated and elected Jeff Kopmanis for the Online Coordinator position.

Our meeting speakers were as follows:

January was a “live” meeting and we had Dr. Edwin Bergin, the Chair of the U of M Astronomy Department as our speaker. He gave us a great presentation about what it takes to build a habitable planet and we had 23 people in attendance.

February featured a presentation by U of M Aerospace Professor, Mike Liemohn. Mike spoke to us about how Mars lost most of its atmosphere. It was an interactive presentation in that we were asked questions which we responded to via text message and responses were tabulated and displayed on the projection screens. The 26 attendees thought this was refreshingly different and we enjoyed it very much.

March what March meeting? Nope, didn't happen.

April was historic for the Lowbrows. This was our first “virtual” meeting. We were familiar with having a speaker via remote connect, but now the whole meeting was. A group of us had tested Zoom during March and April and learned a lot. One of the things we experienced was about security and we learned the hard way because we had two intruders during our first test. But we installed protective measures and it turned out the April meeting was a huge success! We had 52 people “attending” and many members that we have not seen at a live meeting for a long time. We also recorded it on You Tube. Our speaker was Professor Michael Meyer from the U of M Astronomy Department. He spoke about our search for Earth-like planets and the ways we can do that. He explained very well and had some really good graphics to show what he was talking about.

May had 45 people present to hear a very good presentation from Professor David Cinabro, Chair of Astronomy at Wayne State University. David spoke to us about Zowada Observatory, which is a robotic observatory in New Mexico that Wayne State purchased and is operating as a teaching instrument.

June brought Ken Bertin back to us for a presentation about his Great Uncle, Max Fleischer. Max was a cartoonist and amateur astronomer who was the creator of Betty Boop and Popeye, among others. This was another meeting held via Zoom due to pandemic restrictions. Ken has presented to us many times over the years and this time there were 31 people “there” to enjoy it.

July would normally be our annual trip to Sherzer Observatory at Eastern Michigan University, to be entertained by Norb Vance. But, not this year. Instead we convened via Zoom again and we had Jim Shedlowsky talking to 38 of us about the development of larger and larger telescopes. His talk was titled "The Evolution of Giant Telescopes".

August brought us a speaker glitch, just as it did last August. Our speaker had to leave the country, and again like last year, one of our own club members filled the gap admirably. Awni Hafedh filled in with a presentation titled "Astrophotography with a DSLR Camera". It was a great tutorial on what you need to get started, and the 33 of us watching learned a lot.

September For the second month in a row, our scheduled guest speaker had to cancel. Filling in this time was VP Adrian Bradley. Adrian is the also President of GLAAC, the organizing body for our annual multi-club event, Astronomy At The Beach. Adrian and some of the other board members explained how they transformed this extremely popular public event into an online version for 2020. We had 18 people attending. More about AATB 2020 later in this article.

October's meeting was attended by 28 people, who saw U of M Professor Gus Evrard speak to us about computational modeling of the universe and how it can be used to simulate planets and larger scale structure. He also spoke about grade point analysis and trends of U of M students. His talk was titled "Adventures of a Computational Cosmologist: Virtual Worlds and Atlas".

November brought us a fine presentation by Dr. Richard Teague from the Harvard-Smithsonian Center for Astrophysics. His presentation was titled "How to Find Baby Planets" and was about how he and his team use Doppler shift in proto-planetary disks to learn about the planets that are forming there. 39 of us were glued to our screens.

December was a presentation by Ryan Farber, U of M Astronomy, and Lowbrow club member...about galaxy evolution and ultimate fate. Ryan is also heavily involved in Michigan Dark Skies, which is a group of people concerned about light pollution and actively doing something about it. We had a turnout of 38.

We would have started our open house and event schedule for the 2020 season in March. Last year and the one before we had trouble finding time and people to cover all the events we were asked to do. Wow, did that ever come to an abrupt halt! We ended up having to cancel the entire event and open house schedule...with AATB being the one big exception. We did do a comet event at Leslie Park but kept it low-key, fearing too large a turnout for social distancing. But, many people showed up, crowded too close, and many were not wearing masks. We were asked several times during the year to hold some type of observing event, but that experience taught us it would not be safe. In the autumn we were working on a proposed plan to hold some limited events at Peach Mountain, but then the situation with the virus got much worse with the onset of colder weather and holidays.

There was one big exception to our cancelling of events. Earlier in the year, Adrian Bradley, Jeff Kopmanis, and John Wallbank joined Brian Ottum in management of Astronomy At The Beach. The University Lowbrow Astronomers now held all but one of the GLAAC officer positions! They were quickly faced with the question of whether an event could be held at all. Alas; just as with our meetings, the answer was going virtual. But this was much more complicated and multi-layered. There were multiple speakers and observing events going on concurrently Friday and Saturday afternoon and night. As usual, we had some high level speakers but this time from multiple remote locations. Several people had live feeds from their telescopes and observatories, both here in Michigan and from New Mexico. I think everyone that experienced the final product would have to say it was fun and well executed. There were some glitches Friday but they were worked out for the Saturday events. It was most enjoyable being able to sit in front of your screen and bounce from event to event and location to location. Everyone involved in pulling this off is a hero to local astronomy. This was an enormous task and they succeeded! Hopefully the 2021 edition of AATB will be in-person, but probably there will be an online component from here on into the future. Just like our meetings, we see too much benefit to be ignored.

As evidence that we are an aging club...it seems like nearly every year now I have to mention the passing of club member(s). This year was, sadly, not an exception. In 2020 we lost long time members Bernard Friberg and Tom Reichel. Tom often set up his large Dob for Peach Mountain open houses and continued to do so despite his failing health. Bernard was an early Lowbrow club member and held several officer positions. He was mostly known for his work as Observatory Director and at one time our lead person for managing public events. They were both friendly people and we will miss them.

In conclusion, 2020 was a very unique year for our club. Maybe "unique" is being overly polite. Let's face it, 2020 sucked. We are all photon-starved and itching to get outside and do the things we so much love to do. We miss being able to gather in real live groups and not worry about how close we are or how many of us there are. As I write this article, we still cannot return to normal and are not close to being able to do so. But there is hope on the horizon, and we did do one heck of a job making the best of the situation. We continued on with meetings and presentations, we held virtual observing sessions, and we salvaged AATB. Sometimes we have to take a step backward to take a step forward. I think that is exactly what happened here. Out of necessity comes invention, and we did that! When we can return to having our meetings in person we still plan to allow online access and broadcast on You Tube. This opens up a larger audience and members living far away can still "attend". There are some details to doing this hybrid style of meeting, but we are working on that. We also did some needed updates to our By-laws and they now have us covered in the event of a future pandemic. That will happen eventually, but hopefully not for a long time. Because of adversity, we have grown. I also mean grown in numbers. At the beginning of 2021 we reached an all-time high membership count...over 160 strong! Thus, we carry on...

By Charlie Nielsen, January 2021

DIY IR Filter Removal In Your DSLR Camera

By Russell M Vente

Astrophotography is a hobby I have always wanted to pursue. I conclude that now was the time to start learning, being stuck at home this winter with lots of time on my hands. I have a couple telescopes, a tracking mount, eyepieces and a DSLR camera. I guess I have everything I need, right? Well it depends on what you want to take a picture of and each target requires a different approach to get a good picture. After giving it some thought I decided I wanted to take pictures of stuff I normally can't see well.

As you all know, when you look at the night sky, what you see is only a fraction of what is out there. It still surprises me what we could see if only our eyes were more sensitive. The night sky would look drastically different. The problem is that most of the interesting targets are fairly faint. Even with a telescope those little white fuzzy things are just bigger white fuzzy things.

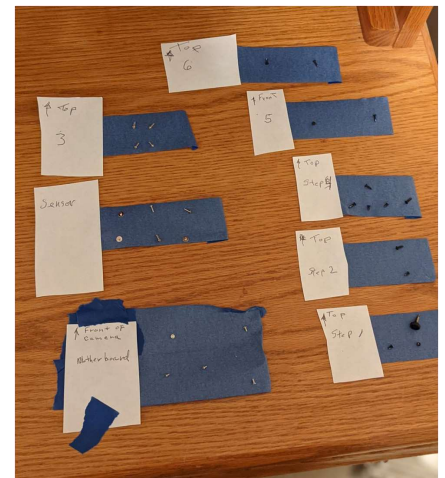
I know my DSLR camera will have to be modified to take dazzling pictures of hydrogen alpha emissions nebulae. You can take pictures of the moon, planets and star clusters without any modifications to the internals of your camera but to capture the H-Alpha part of infrared spectrum my camera will need modification. My equatorial mount might not be good enough for good tracking but I'll deal with that later. The modifications of my DSLR shall come first. You can send out your camera to someone to have it done or you can do it yourself. The remainder of this article will focus on my experience removing the DSLR filter(s) myself.

The camera I have is a Canon EOS Rebel T4i. The T4i is a 2012 vintage camera not too old but certainly not a new one. So if I screw it up I get to buy a new camera then let someone else do the modification. I did some research on disassembling the T4i, there are lots of YouTube videos which clearly show how to do this. After watching them I said "I can do that."



The photo left shows the tools I used for the job. The most important tool you have to get right is the screwdriver. The screws on the canon look like Philips head screws. DO NOT, I repeat DO NOT use a small Philips screwdriver. If you do you run a very high risk of rounding out the screw head, then your screwed. The screws are JIS (Japanese Industrial Standard) screws. They are designed not to round out if you apply large amount torque to get the screw out. I bought a small set of JIS screwdrivers and used the red one for most of the job. It is a JIS #00. I also needed a Torx T7 for some screws.

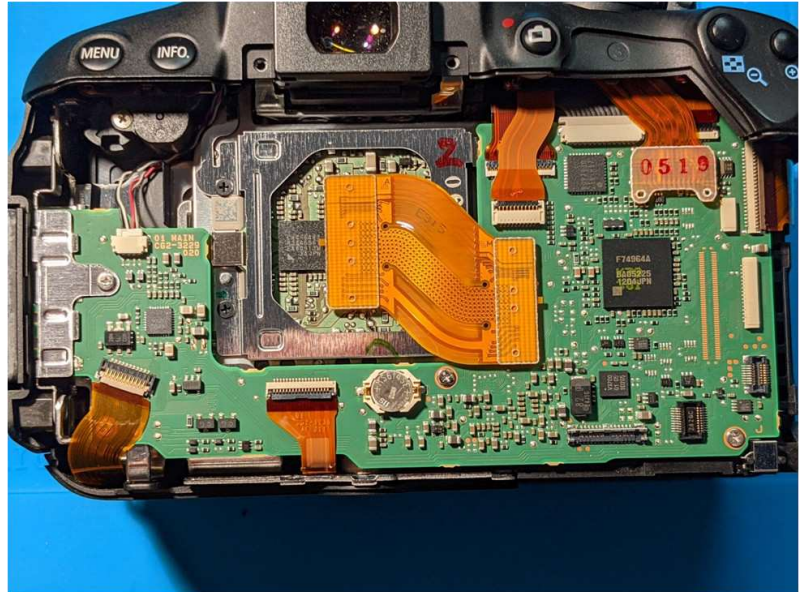
As you get the screws out keep track of where they go and put them back in the same hole they came out of, there are several different lengths. The method I use is to stick the screws on tape and label the tape where they came from and in the same relative position as the part they came from, see picture to the right.



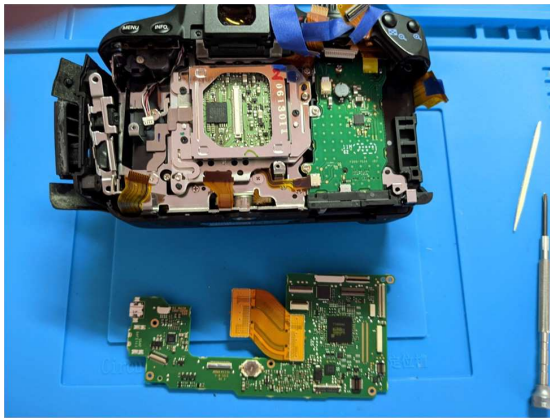
Let's look at the major steps in disassembly, when all the preparation is finished It's time to have at it. Each camera of course, will have different details but they all seem to follow these major steps. It's a good idea to take pictures along the way to help reassemble the camera.



Step 1 Remove the back of the camera.

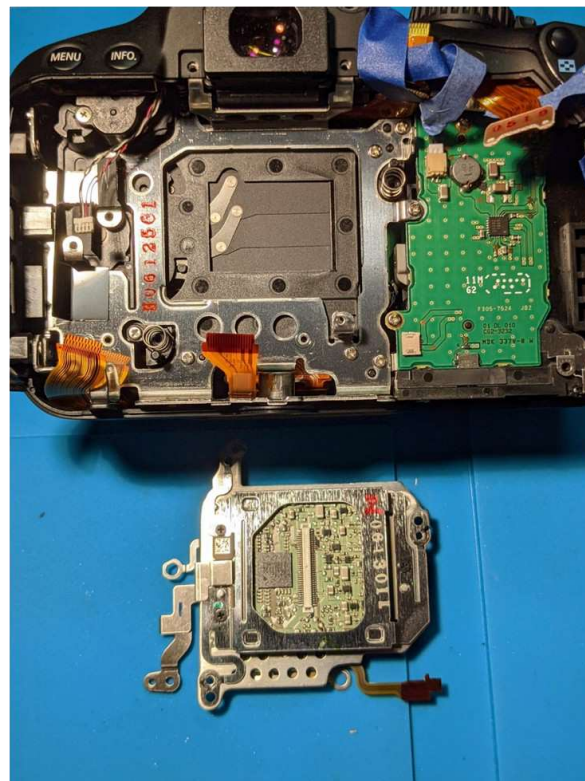


Some cameras may need more than the back removed. At this time what you see is the motherboard. The cables on the motherboard have to be disconnected in order to remove the motherboard. The ribbon cables slide out of the connectors with the help of a couple of toothpicks. Some of those connectors have a latch that lifts up to release the cable. Reconnecting the cables later on is a little more time consuming but not difficult. Using toothpicks to align and push on the tabs makes it a pretty straightforward procedure.



Step 2 Remove the motherboard. With the motherboard removed we now have access to the sensor assembly. The sensor assembly has the filter assembly attached to it. That's the part we want.

Step 3 Remove the sensor assembly. On the front side of the sensor assembly is the filter assembly containing the filter(s). The Canon cameras have two filters. LPF 1 and LPF 2, the one we want to remove is LPF 2 which is behind LPF 1.





Step 4 Remove filter(s).

In removing LPF 2 I broke it, but that's ok because I don't need it any more. The last step is to reassemble the camera. But first there are additional considerations which you need to address preferably before you even start to dissect your camera. Such as, is this camera going to be used just for astrophotography or everyday use as well? Should I leave LPF 1 out of the camera or put it back in. The hyperlink below will take you to a Cloudy Nights discussion which addresses these and additional questions far better than I could. Happy picture taking.

<https://www.cloudynights.com/topic/483662-knowing-dslr-mod-types/>



The January meeting was recorded and can be viewed on you tube.

<https://youtu.be/UBxNWtV1sZU>

Upcoming Events

Open House events have been canceled until further notice.

DATE	EVENT	LOCATION	
Friday Feb. 19th 7:30 pm	Monthly Meeting	By Video Conference. Instructions will be emailed to members,	Dr. Sean Gavin, Professor and Associate Chair, WSU Physics/Astronomy Dept, Topic: Lord Kelvin and the sun

University Lowbrow Astronomers

Monthly Club Meeting Minutes

15 January 2021, 7:35 pm, Individual Live Connections via conferencing tools

After some chatter to allow for late arrivals, President Charlie Nielsen called the meeting to order and then introduced our speaker.

Speaker

Who

Prof. Emeritus Patrick Seitzer, UofM Astronomy

Subject

Large Constellations of Satellites in Low Earth Orbit and Optical Astronomy

A Q&A session occurred afterward with audience members using multiple formats to ask questions. Charlie thanked our speaker for the presentation.

Business Meeting

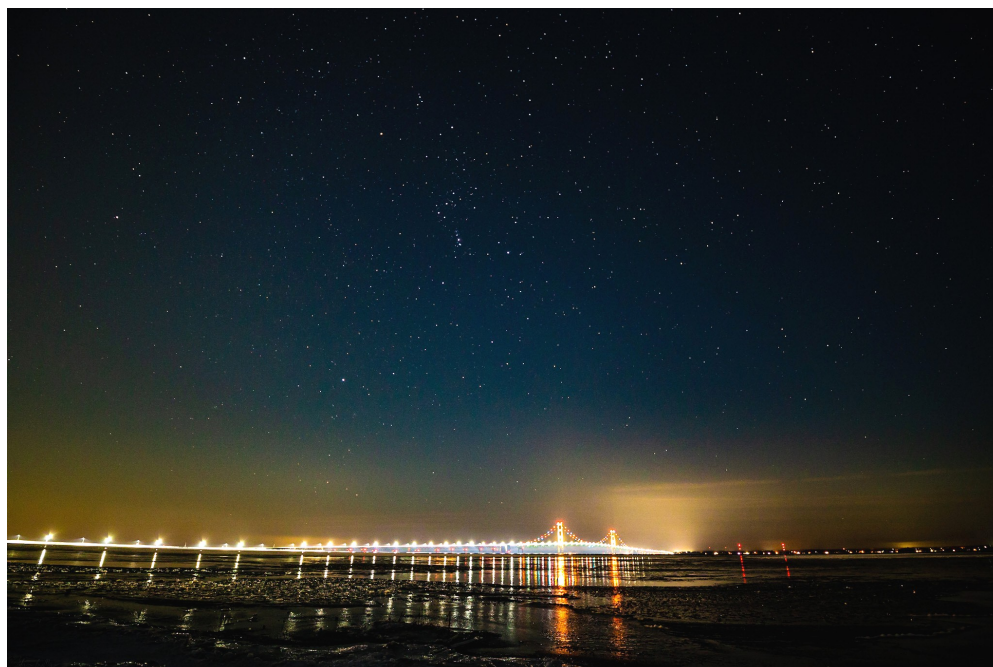
Name	Topic
President Charlie Nielsen (1:08:12)	<ul style="list-style-type: none"> Report to the membership that Lowbrow Tom Reichel has passed away. He asked a couple of members who knew Tom to say some words as he didn't know Tom well. <p>Jim Forrester - He was a bit of a character. His day job was supplying tires to race car companies and he enjoyed discussing car-related things. Besides astronomy, he was interested in politics. He started coming out to Peach Mountain with his 18" Webster and was always excited to be out there. It was fun talking with him, and I will personally miss him. Tom was suffering from cancer, and at the very end, Alzheimer's, and his family has suggested any contributions be sent in his name to the Alzheimer's Association.</p> <p>Doug Scobel - I knew Tom for several years. I had the privilege of seeing Tom at least once or twice a year to renew his dues or purchase a Lowbrow t-shirt or two. He always felt more comfortable coming to my office parking lot in Auburn Hills. We had some good conversations regarding sports cars and other topics, and we even talked about astronomy from time to time. He was a very interesting guy, and I'm glad I got to know him.</p> Doug Warshow recently sent Charlie and Dave Jorgensen a link to a resource for UofM speakers. Dave is already working on these but is reminded that all Lowbrows are eligible to be speakers. Some of our very best talks have come from within our club.
Vice President Joy Poling (1:14:55)	Recently updated events on Night Sky Network to 'online' through March.
Vice President Adrian Bradley (1:15:30)	Wants to put out the call to all Lowbrows to attend the next GLAAC meeting on February 11 th . Looking for input and discussion from members about repeating the way we did last year and the possibility of what a hybrid event might look like. Having uncertainty about what we can accomplish in September leaves us looking in multiple directions. Any ideas or help with planning are welcome. Astronomy At The Beach is a big event, yet less than

	half a dozen people have done the majority of the planning. Last year some extra volunteers came in at the end but would have been welcomed much sooner. This type of event takes the whole year to plan. Please volunteer for the planning committee.
Vice President Jim Forrester (1:22:20)	<ul style="list-style-type: none"> • MLive has published this year's hours for the new Dark Sky Park in Cass county, Dr. Lawless County Park. Wants to warn Lowbrows about the potential risks involved as the article had no mention of covid precautions or plan if large amounts of sky viewers were to show up. • Many have been questioning if we could open Peach Mountain for 'Members Only' nights, but given how out of control the pandemic has been as of late, it was decided that now is not a good time to approach the University with the request.
Treasurer Doug Scobel (1:25:30)	Since our last meeting, we have added six new members. That puts the membership at 161. The treasury is at \$9,603.14. Also, we received another \$50 donation in memory of Bernard Friberg.
Newsletter Editor Don Fohey (1:27:47)	As mentioned before, this is his last term as Newsletter Editor and he has three more issues to put out. In the newsletter email, he will put in encouragement for others to be the Newsletter Editor.
Online Coordinator Jeff Kopmanis (1:28:42)	The peak tonight was 43. We had up to 39 on Zoom and up to 5 on YouTube.
Observatory Director Jack Brisbin (1:29:18)	The Observatory still looks good. The road is ok as it hasn't had much snow. The talk of possibly getting Internet up there has been put on hold due to the proposed AT&T tower.

About 43 devices attended tonight's virtual meeting.

Adjourned
8:56 pm

Minutes were taken and transcribed by
Joy Poling



Stars over Mackinac

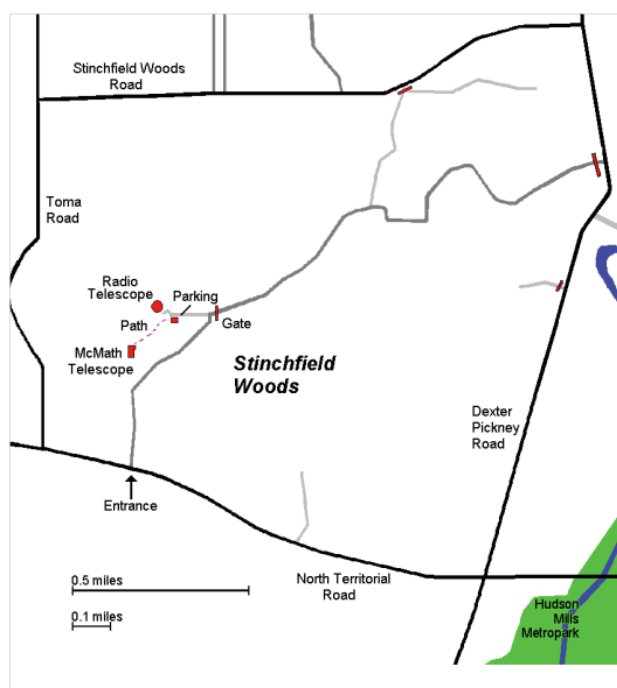
Adrian Bradley emailed this photo to members on Jan. 4th.

“Just before moonrise... I was able to capture an image of Orion n friends rising above the Mackinac bridge.”

Places & Times

Monthly meetings of the University Lowbrow Astronomers are held the third Friday of each month at 7:30 PM. The location is usually Angel Hall, ground floor, Room G115. Angell Hall is located on State Street on the University of Michigan Central Campus between North University and South University Streets. The building entrance nearest Room G115 is the east facing door at the south end of Angell Hall.

Peach Mountain Observatory is the home of the University of Michigan's 25 meter radio telescope and McMath 24" telescope which is maintained and operated by the Lowbrows. The entrance is addressed at 10280 North Territorial Road, Dexter MI which is 1.1 miles west of Dexter-Pinckney Rd. A maize and blue sign marks the gate. Follow the gravel road to the top of the hill to a parking area south of the radio telescope, then walk about 100 yards along the path west of the fence to reach the McMath Observatory.



Public Open House / Star Parties

Public Open Houses / Star Parties are generally held on the Saturdays before and after the New Moon at the Peach Mt. Observatory, but are usually cancelled if the forecast is for clouds or temperature below 10° F. For the most up to date info on the Open House / Star Party status call: (734) 975-3248 after 4pm. Many members bring their telescope to share with the public and visitors are welcome to do the same. Mosquitoes can be numerous, so be prepared with bug repellent. Evening can be cold so dress accordingly

Lowbrow's Home Page

<http://www.umich.edu/~lowbrows/>

Membership

Annual dues are \$30 for individuals and families, \$20 per year for students and seniors (age 55+) and \$5 if you live outside of the Lower Peninsula. Membership entitles you online access to our monthly Newsletters and use of the 24" McMath telescope (after some training). A mailed copy of the newsletter can be obtained with an additional \$18 annual fee to cover printing and postage. Dues can be paid by PayPal or by mailing a check. For information about dues or joining the Lowbrows contact the club treasurer at:

lowbrowdoug@gmail.com.

Lowbrow members can obtain a discount on these magazine subscriptions:

Sky & Telescope - \$32.95/year or \$65.90/2 years

Astronomy - \$34.00/year, \$60.00/2 years or \$83.00/3 years

For more information about magazine subscriptions contact the club treasurer.

Newsletter Contributions

Members and non-members are encouraged to write about any astronomy related topic. Contact the Newsletter Editor: Don Fohey donfohey@gmail.com to discuss format. Announcements, articles and images are due by the 1st day of the month as publication is the 7th.

Telephone Numbers

President:	Charlie Nielsen (734) 747-6585
Vice President:	Adrian Bradley (313) 354 5346
	Jim Forrester (734) 663-1638
	Joy Poling
	Dave Jorgensen
Treasurer:	Doug Scobel (734) 277-7908
Observatory Director:	Jack Brisbin
Newsletter Editor:	Don Fohey (734) 812-3611
Key-holders:	Jim Forrester
	Jack Brisbin
	Charlie Nielsen
Webmaster	Krishna Rao
Online Coordinator	Jeff Kopmanis

A NOTE ON KEYS: The club currently has three keys each to the Observatory and the North Territorial Road gate to Peach Mountain. University policy limits possession of keys to those who they are issued. If you desire access to the property at an unscheduled time, contact one of the key-holders. Lowbrow policy is to provide as much member access as possible.

Email to all members

Lowbrow-members@umich.edu



University Lowbrow Astronomers



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University Lowbrow Astronomers
P.O. Box 131446
Ann Arbor, MI 48113

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