

**NASA Chat: Stay 'Up All Night' to Watch the Lunar Eclipse  
Experts Mitzi Adams and Alphonse Sterling  
April 15, 2014**

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*Moderator\_Brooke:* Welcome everyone! Our experts are getting ready to take your questions! Two more minutes -- thanks for being here!

Lola: How often do these lunar eclipses occur?

*Alphonse\_Sterling:* For lunar eclipses, between 0-3 per year, and an average of about 1.5/year.

Enrique: are you ready for this!

*Alphonse\_Sterling:* We are!

5678shane: when will this live stream be shown

*Alphonse\_Sterling:* The Ustream is about to go live on this page, in the window below this chat module.

Ray: thank you nasa

*Alphonse\_Sterling:* Our pleasure!

Polakgger: what time the moon's eclipse begins ?

*Alphonse\_Sterling:* For those in the U.S., a brief guide to the eclipse phases: Penumbral eclipse begins 12:55 a.m. EDT Partial eclipse begins 1:59 a.m. EDT Total eclipse begins 3:08 a.m. EDT Maximum eclipse is at 3:46 a.m. EDT Total eclipse ends 4:23 a.m. EDT Partial eclipse ends 5:32 a.m. EDT Penumbral eclipse ends 6:36 a.m. EDT.

Ali\_Isaia: Hi! When is the best time to see the eclipse in Miami?

*Alphonse\_Sterling:* Hi Miami! Try this For those in the U.S., a brief guide to the eclipse phases: Penumbral eclipse begins 12:55 a.m. EDT Partial eclipse begins 1:59 a.m. EDT Total eclipse begins 3:08 a.m. EDT Maximum eclipse is at 3:46 a.m. EDT Total eclipse ends 4:23 a.m. EDT Partial eclipse ends 5:32 a.m. EDT Penumbral eclipse ends 6:36 a.m. EDT.

Northdakody: Where in the sky will the moon be?

*Alphonse\_Sterling:* Around midnight, almost directly overhead.

Danny: How many moon eclipses are going to be in this year?

*Alphonse\_Sterling:* Two -- next in Oct. 8. Two more next year as well.

Ter: Can you start the live feed now before the eclipse starts please.

*Alphonse\_Sterling:* It will be going live very shortly!

Katia: hey ! i was wondering if the live stream would be able to veiw tomorrow?

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*Alphonse\_Sterling:* We're going to try to rebroadcast this tomorrow on Ustream.

Kobalt69: Why is it called the blood moon if it looks like an eclipse?

*Alphonse\_Sterling:* Because the moon turns a reddish color, but doesn't go completely dark.

Nyu: How long will last the eclipse?

*Alphonse\_Sterling:* Totality is 1 hour and 18 minutes.

ShowNunBatToe: Mr. Sterling, I am a physics major at UCSD who wants to specialize in astrophysics/cosmology. This is truly my passion, but I'll need to be able to make a living. What career opportunities are available with my degree? Without looking into it at all I can only think of Academia and NASA.

*Alphonse\_Sterling:* Hi there! It depends on what you want to specialize in. There are observatories and other government institutions besides NASA: Smithsonian Astrophysical Observatory, Naval Research Laboratory, and some companies have contracts with NASA.

Ebalut: What is this lunar eclipse called? does it have a name or no?

*Mitzi Adams:* Some people call it a "blood moon." It's the first in a tetrad of lunar eclipses and Native American tribes in the north and eastern U.S. call a pink moon and this refers the full moon itself. They call it a pink moon because of the blooming of wild ground phlox, a pink blooming wildflower.

Ter: Does this eclipse change the tides or anything like that?

*Mitzi Adams:* No.

Arma: why on that eclipse the color of the moon is red?

*Alphonse\_Sterling:* Because sunlight is refracted into the shadow area and because it goes through a lot of Earth's atmosphere, all the blue light is filtered out, and only the red light is visible. It's similar to what happens during sunrise and sunset, when the sun looks red.

Brandi: I'm excited to see this!

*Alphonse\_Sterling:* Welcome!

Danny\_James: my question is, why so many clouds?

*Alphonse\_Sterling:* We'd like to know that, too. ☺

seraphim718: what is a tetrad? and when was the last tetrad?

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*Mitzi Adams:* A tetrad is a group of four eclipses. The last tetrad was in 2003 and the next is in 2032. There were five tetrads in the 20th Century.

Killebrew: What exactly is the penumbral portion of the eclipse?

*Alphonse\_Sterling:* It's when only part of the sun is shining on the moon. So if you were standing on the moon in the penumbral shadow you'd only see about half of the sun above the Earth.

liont5007: these is the only eclipse in this year?

*Alphonse\_Sterling:* The next is total lunar eclipse is Oct. 8.

tek92: nasa is AWSOME for doing this

*Alphonse\_Sterling:* Why thank you! We think you're awesome for being here.

DeHaven: well I'm definitely going to be up late tonight

*Alphonse\_Sterling:* Yes, and you'll have a LOT of company!

TOJO: What kinds of important information do we learn about Earth when a lunar eclipse happens?

*Mitzi Adams:* We can learn things about the atmosphere of the Earth when an eclipse happens.

JessDaniel: When starts the streaming?

*Alphonse\_Sterling:* Very shortly -- stay tuned!

LoveTheReds: Thank you for hosting this chat, folks. Does it make any difference where in the US you are?

*Alphonse\_Sterling:* Hi Reds! All of the U.S. can see this event except for parts of Alaska.

gary\_latimer: Any idea why we didn't have any for a 300 year period and now they are more common?

*Alphonse\_Sterling:* Actually, they happen pretty consistently -- about 1.5 average lunar eclipses per year.

Fmartins0: When does the eclipse start?

*Mitzi Adams:* For those in the U.S., a brief guide to the eclipse phases: Penumbral eclipse begins 12:55 a.m. EDT Partial eclipse begins 1:59 a.m. EDT Total eclipse begins 3:08 a.m. EDT Maximum eclipse is at 3:46 a.m. EDT Total eclipse ends 4:23 a.m. EDT Partial eclipse ends 5:32 a.m. EDT Penumbral eclipse ends 6:36 a.m. EDT

Ajusunny: what is eclipse will you please explain that?

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*Alphonse\_Sterling:* An eclipse is when one celestial body falls into the shadow of another celestial body.

Cmagana: does anybody have a good link to follow this eclipse?

*Alphonse\_Sterling:* We do. When we have coverage, this is a good link:

<http://www.ustream.tv/channel/nasa-msfc>

Northdakody: During which phase will it look red?

*Mitzi Adams:* It will actually start looking reddish during the partial phase. It'll be the deepest red during mid-eclipse when the moon is centered in the shadow of the Earth.

*Alphonse\_Sterling:* Hi everyone -- getting a lot of questions about times and viewing. You can find out more about times and viewing here: <http://eclipse.gsfc.nasa.gov/LEplot/LEplot2001/LE2014Apr15T.pdf>

To convert the times on this link to your local time, use this: <http://ssd.jpl.nasa.gov/tc.cgi>. For those in the U.S., a brief guide to the eclipse phases: Penumbral eclipse begins 12:55 a.m. EDT Partial eclipse begins 1:59 a.m. EDT Total eclipse begins 3:08 a.m. EDT Maximum eclipse is at 3:46 a.m. EDT Total eclipse ends 4:23 a.m. EDT Partial eclipse ends 5:32 a.m. EDT Penumbral eclipse ends 6:36 a.m. EDT.

greatgoose29: is there any special precautions with looking at a lunar eclipse

*Alphonse\_Sterling:* No, no special requirements.

Abe: Will this be visible on the east coast? It's cloudy now.

*Alphonse\_Sterling:* East Coast will have a view as long as skies are clear.

Doc: What is an Penumbral eclipse

*Mitzi Adams:* The penumbral part of the eclipse is when the moon enters the part of the shadow which is not very dark. The word "penumbra" comes from the Latin "paene-umbra". Paene' means almost.

*Alphonse\_Sterling:* Lots of questions about Ustream view. We're about to start showing the view from Los Angeles at the Griffith Observatory: <http://www.ustream.tv/channel/nasa-msfc>

Dave: Where is the live feed camera located?

*Alphonse\_Sterling:* Hi Dave -- they will be from several places across the U.S. as they become available!

*Alphonse\_Sterling:* There we go! Look at the moon! <http://www.ustream.tv/channel/nasa-msfc>

Vortexanot: Any suggestions for a drink to enjoy while watching this celestial event?

*Alphonse\_Sterling:* Moonshine? ☺

Rosebud: Does global warming and CO2 Emissions in the sky give us a better show tonight?

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*Mitzi Adams:* I don't think excess carbon dioxide in the atmosphere will affect our viewing this evening.

Sergiordzz: hello, does astronauts in the space, can see this?

*Alphonse\_Sterling:* Hi Sergio -- yes, they should be able to see it for the time they're on the correct side of the Earth.

Carl\_Sagan: What is the longest totality of an eclipse on record?

*Alphonse\_Sterling:* For solar, about 7.5 minutes. We're not sure about lunar.

DaniG: are you saying in the eastern part of the U.S. it will look pink?? Or will it look the same all over the U.S.

*Alphonse\_Sterling:* It looks the same all over, but reddish. But it won't be pink -- that's from Native American lore because the moon of this month was full while pink flowers bloom in spring. It has nothing to do with the color you'll see.

Damien: If the moon's color is due to an atmospheric condition caused by the Earth's shadow and red spectrum being refracted. What prevents the moon from displaying other colors from the spectrum?

*Alphonse\_Sterling:* Good question. The other colors are scattered out of the light path, so only the red light remains.

Annabanana: Hi Everyone! I have been curious, could you explain precisely why the moon can turn red during a total lunar eclipse. Something about light wavelengths? Also are the color changes only possible during a total eclipse or can they occur during partial eclipses as well?

*Mitzi Adams:* The reddening occurs because light is refracted and blue light is scattered out, so the only light left is red light. Yes, there will be a reddish light during a partial phase, but because the moon is so bright, it will be more difficult to see --- it is more subtle.

astrogirl098: are there other colors of eclipses besides red/pink? ex: blue, green, purple, ect.

*Alphonse\_Sterling:* No, but orange-red and darker colors (brown, charcoal, almost black) if atmospheric conditions are right. (For example, after volcanic eruptions.)

sarah18: Is there any danger while looking through a telescope?

*Mitzi Adams:* No, it is perfectly safe --- this is not like a solar eclipse.

talosman@yahoo.com: What else do you do at NASA, Alphonse?

*Alphonse\_Sterling:* I'm an astrophysicist, and I specialize in solar science at NASA's Marshall Space Flight Center. My specialty is studying the onset of both large-scale and small-scale solar eruptions.

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Clarissa: Is the entire Ustream going to be from the Los Angeles observatory?

*Mitzi Adams:* We have a variety of sources we will rotate through during the night. It's raining here in Huntsville and we'd like to show the progression of the eclipse from different parts of the country.

Jordan: Does this eclipse play any role with weather at all

*Alphonse\_Sterling:* No, there's no relationship.

Dspradau: Evening guys! On a scale of 1 - 10, how excited are you!?

*Alphonse\_Sterling:* About...pi, only because it's cloudy here. ☺

Ronnie: whoa cool! good question and answer :-)

*Alphonse\_Sterling:* Glad you like it. ☺

moonlover69: I love the moon

*Alphonse\_Sterling:* So do we!

Hushypuppy: i heard that the eclipse can change your mind, is that true?

*Alphonse\_Sterling:* Guess that depends on how persuasive it is? ☺

Yue: Is there another type of phenomenon of color change of the moon, the moon as blood or Blue Moon?

*Alphonse\_Sterling:* Conditions such as volcanic eruptions and exceptionally large fires can create unusual colors for the moon.

Carl\_Sagan: Why are solar eclipse totalities so much shorter than lunar?

*Mitzi Adams:* Because the shadow cast on the Earth is much smaller than the shadow the Earth casts on the Moon. Because it's the shadow of the Moon during a solar eclipse that causes the eclipse and the shadow of the Moon is much smaller.

Clarissa: What is the difference between the blood moon and the blue moon?

*Alphonse\_Sterling:* Blood moon is slang for the eclipsed moon, when it appears reddish. A blue moon is most commonly seen as the second full moon in a calendar month -- but nothing to do with its actual color.

Rigs005: I'm hoping we can! It's done nothing but rain! I was so excited to see this and I can't!

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*Alphonse\_Sterling:* That's too bad, but we're streaming on our feed:

<http://www.ustream.tv/channel/nasa-msfc>

Kouleifoe: Isn't it like a shadow being cast upon the moon itself?

*Mitzi Adams:* It is a shadow being cast on the moon.

*Alphonse\_Sterling:* Hi everyone -- take a look at the Ustream feed. If you look at the left side, you'll see the darkening due to the progressing of the penumbral phase of the eclipse.

<http://www.ustream.tv/channel/nasa-msfc>

Ibobp: So what exact stage is this eclipse currently at?

*Alphonse\_Sterling:* As of right now ( 1:42 EDT) it's at the penumbral stage.

talosman@yahoo.com: I'm feeling alone and dumb..... No one seems to know I'm here..

*Alphonse\_Sterling:* We see you, and we're glad you're here. ☺

Brandon\_Cheema: whats up with the music

*Alphonse\_Sterling:* That's Third Rock Radio.

Annabanana: Thanks! Next question, I see lots of talk about atmospheric conditions affecting the color that will show during an eclipse so what kind of conditions would lead to more of the red appearance and what would lead to say an almost black appearance?

*Mitzi Adams:* Strong volcanic activity has caused the moon to look almost black.

ts\_demas: Do you need any special gear to see the blood moon

*Alphonse\_Sterling:* Only your eyes -- but better with binoculars, if you have them.

Bucky666: Is this a good opportunity to observe another Celestial Bodies?

*Alphonse\_Sterling:* Yes -- you can see dimmer stars during the total phases. The bright star nearest the moon is Spica and planet Mars is about an "extended fist distance" away from the moon. (It will be bright red and star-like.)

moonlover69: IS the moon bigger than the earth because i bet a couple guys it was and theyre gonna break my thumbs if im wrong

*Alphonse\_Sterling:* Goodbye, thumbs. ☺

LRoberts: does the moon rotate??

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*Mitzi Adams:* Yes. The same rate that it goes around the Earth.

*Alphonse\_Sterling:* Hi everyone -- just wanted to say thanks for all these great questions. We're working to get responses out as quickly as we can. Thanks for your patience!

Shelaghc: What sort of reaction do the tides have to lunar eclipses, if anything?

*Mitzi Adams:* Lunar eclipses only occur when the moon is full. High tides occurs when the moon is full. But there is nothing special about tides during an eclipse.

Lorana: We're waiting for you, Blood Moon :D

*Alphonse\_Sterling:* And it's starting to appear, now in the penumbral stage.

MmmmYah: Why is there such significance to tetrads? Have larger (e.g. 5 or 6) or smaller (triads) of eclipses never occurred?

*Alphonse\_Sterling:* Well, there's nothing particularly special about them. These are normal cycles that sometimes line up to make a group of them close in time. The natural motions of the celestial bodies.

Rosebud: How many years in advance have lunar eclipses been accurately predicted? Is it basically a perfect science now or does it have an x-factor you can't get down?

*Mitzi Adams:* Eclipses have been predicted to about the year 3000 and there are variations that will occur for which we have not totally compensated, but as time goes on the variations will become known so the accuracy can be extended farther in the future then.

Aaa: Hello everyone. So let me get this straight. The red color is because of the light refraction, right? And the fact that Mars is the responsible for the eclipse has nothing to do with the color.

*Alphonse\_Sterling:* That's correct -- refraction from the Earth's atmosphere. But Mars isn't responsible for the eclipse.

Toby\_King: In NC is raining we won't be able to see it. What time will you start your live transmission?

*Alphonse\_Sterling:* It's happening now on the stream! Penumbral stage:  
<http://www.ustream.tv/channel/nasa-msfc>

Aaa: By the way, greetings from Mexico

*Alphonse\_Sterling:* Hello to Mexico!

Xklownx: Would the moon still be red if you were looking at it from the space station

*Alphonse\_Sterling:* Yes, it would.

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LRoberts: Will eclipse pass left to right on the screen?

*Mitzi Adams:* Yes.

Carl\_Sagan: should we be worried about this so called tetrad?

*Alphonse\_Sterling:* No -- it's a consequence of the natural motion of the Earth, moon and sun.

*Alphonse\_Sterling:* Take a look at the feed: <http://www.ustream.tv/channel/nasa-msfc> This is the deepest part of the penumbral phase. The umbral phase is getting ready to start (the partial phase.) That's the sharp darkening you'll see on the left side of the moon.

NathFray: Thank you for all this information! :)

*Alphonse\_Sterling:* It's our pleasure!

Carl\_Sagan: Is the moon made out of cheese?

*Alphonse\_Sterling:* Mmmmm....if so, I'd like to be there. I'm pretty hungry!

samik124: Hey! First of all, I'd just like to say it's so cool that you guys are answering our questions and stuff! Second, how often does an eclipse like the one tonight happen?

*Alphonse\_Sterling:* Thank you! On average, 1.5 times a year. For this year and 2015, two per year.

Carl\_Sagan: What is more important the moon or the sun?

*Alphonse\_Sterling:* For the eclipse, they both get equal billing!

Annabanana: lol pi, great answer haha

*Alphonse\_Sterling:* ☺

epnut99: Please explain exceptionally large fires and moon color.

*Alphonse\_Sterling:* If it's large enough to the particles into the high atmosphere of Earth's and spread over large areas, similar to volcanos.

Len: will the shadow be moving from left to right?

*Alphonse\_Sterling:* Yes, that's what you're seeing on the stream.

Gtonexo: Are you guys actual people, or generated responses?

*Alphonse\_Sterling:* We're human!

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*Alphonse\_Sterling:* Hi everyone -- we have many, many questions asking how to see the Ustream feed. Due to the volume of questions, we can't respond to all of them, but please visit the Ustream link: <http://www.ustream.tv/channel/nasa-msfc> You can see the eclipse has already started!

Dark\_Moon: Are you talking about the stream right below this chat Alphonse?

*Alphonse\_Sterling:* Yes, that's the one, and you can also access this link directly if the embedded feed is slow: <http://www.ustream.tv/channel/nasa-msfc>

J: Woah, it's getting dark real quick...

*Alphonse\_Sterling:* Yes, it's advancing very dramatically.

Czarkasim: will the eclipse occur from left to right? or top to bottom?

*Alphonse\_Sterling:* From left to right...

Gentlewind: I have not seen any of my questions acknowledged.. and have seen others acknowledge more than once already. Can I be seen here? I am wondering if we should be able to see the streaming on ustream link below as I cannot see anything

*Alphonse\_Sterling:* Hello there. You can view the stream here, and the eclipse is starting!  
<http://www.ustream.tv/channel/nasa-msfc>

J: If you were standing on the moon, would everything look red?

*Alphonse\_Sterling:* If standing where it's total, you would see the Earth as a black disk with a bright red rim around it (the Earth's atmosphere)

Rosebud: Does NASA have photographs of what a total eclipse might look like from the Moon? I can't seem to find any. Does anyone care? I do.

*Mitzi Adams:* [http://en.wikipedia.org/wiki/June\\_2011\\_lunar\\_eclipse](http://en.wikipedia.org/wiki/June_2011_lunar_eclipse)

MatthewJ: Can you increase your chat licenses? Just got disconnected and when I tried to reconnect I got this message: Access Denied. Chat service license limit has been reached.

*Alphonse\_Sterling:* Hi Matthew -- we could, but unfortunately, it really slows down the response with lag.

J: Where's the Griffith Observatory?

*Alphonse\_Sterling:* In Los Angeles, California.

Rmuckley: wishing i had a better camera tonight, perfectly clear skies. what time should i wake my kids up to get a view of the full eclipse?

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*Mitzi Adams:* About 3 a.m. Eastern Time. The full eclipse begins at 3:08 a.m.

J: Is that the Sea of Tranquility?

*Alphonse\_Sterling:* It's blurred out right now in this view, but to the right of center.

Randy: How can I see the moon directly if too cloudy?

*Mitzi Adams:* Watch the Ustream feed.

<http://www.nasa.gov/topics/solarsystem/features/watchtheskies/lunar-eclipse-2014.html#.U0y94bweYWK>

Brandi: Mars is suppose to be near the Earth tonight as well, right? Where will it be located during the event?

*Alphonse\_Sterling:* It's about 10 degrees away from the moon, and if your extend your fist out, it's about the size of your fist (red and bright).

Tarvex: Alphonse! Did you read this?

*Alphonse\_Sterling:* I did. ☺

J: Didn't the moon used to be part of the Earth during Earth's formation? Or am I just way off?

*Alphonse\_Sterling:* You're not way off. The most recent ideas about the moon's formation say it was caused when the young Earth was struck by a planetoid object and part of that object formed the moon.

cuEvangelist: Thanks for the heads up Mr. Sterling, for a minute there I thought I had to wait for another blood moon for an answer to my question.

*Alphonse\_Sterling:* Hopefully not that long!

allyssa20: when would be the best time to actually see the eclipse the best

*Alphonse\_Sterling:* All the phases are interesting but totality is probably most dramatic.

Vicheresc: Does this kind of eclipse has influence on Earth's ocean water levels?

*Alphonse\_Sterling:* No more than the normal full moon -- the tides are slightly higher during a full moon than at other times, since the sun and moon are pulling from opposite sides on the water.

Carl\_Sagan: I heard there are going to be meteor showers soon for the East Coast is that true?

*Alphonse\_Sterling:* The next meteor shower is next week, the Lyrids.

Legitimaro: How do you predict an eclipse?

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*Alphonse\_Sterling:* The motions of the celestial bodies are extremely regular. Those motions are determined by basic physical principles, such as the law of gravity. We understand these principles very well, so we can solve the equations of physics that describe the motions for those objects. Long ago ancient people began to understand and be able to predict them by watching the repetitions over many tens and hundreds of years. Now we do better with the equations of physics.

LRoberts: When the moon hits your eye like a big pizza pie, that's amore. Tonight is amore!!

*Alphonse\_Sterling:* Hahahaha!

Nigel: are there any types of eclipse that can occur when the moon isnt full.

*Alphonse\_Sterling:* A solar eclipse occurs when the moon is new, but that's the only other kind.

*Moderator\_Brooke:* Hey everyone, we're busy and loving it! Thanks for your patience as we answer your questions.

physicsstudent15: How often do lunar eclipses occur?

*Alphonse\_Sterling:* On average 1.5 times a year, but this year and next year we will have two each.

Bee: when is the next solar eclipse?

*Alphonse\_Sterling:* There is a partial one in about two weeks. The next total one is March 20, 2015.

Capt.\_Kirk: Alphonse Is there a noticeable cooling on the lunar surface during the event, if so how much does the temp drop at max coverage? Thanks in advance.

*Alphonse\_Sterling:* Yes, there will be cooling, but the exact amount I can't say right off.

Capt.\_Kirk: Alphonse Is there a noticeable cooling on the lunar surface during the event, if so how much does the temp drop at max coverage? Thanks in advance.

*Alphonse\_Sterling:* Yes, there will be cooling, but the exact amount I can't say right off.

Hellaturnt: From which side of the moon will the eclipse begin?

*Alphonse\_Sterling:* On the screen, from the left side.

Dspradau: How quickly is the shadow of the Earth crossing the surface of the Moon?

*Alphonse\_Sterling:* Based on the time of the start of the partial eclipse and the start of the full eclipse and knowing the Moon 2,160 miles across, about 2,000 miles per hour.

*Moderator\_Brooke:* Check out the Ustream feed! <http://www.ustream.tv/channel/nasa-msfc> What you're seeing is the main part of the Earth's shadow covering about half of the moon. Notice this is a

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round shadow. Observations such as this by ancient people helped them understand the Earth is round, not flat.

physicsstudent15: First and foremost you guys are really awesome for taking the time to answer questions like this and as a student this really means alot so thank you! :) Second , During the lunar eclipse will the moon appear to have 'vanished' for a little bit as part of the different phases?

*Alphonse\_Sterling:* It will become a red color and how dark that red color is depends on the global state of the Earth's atmosphere, so we don't know how dark it will get. In some rare cases, the Moon has gotten so dark that it has seemed almost black.

Tarvex: So is this the same effect when you see the moon orange in the morning?

*Alphonse\_Sterling:* Essentially, it is, because in the morning and evening, the light of the moon comes through a large segment of the Earth's atmosphere and the Earth's atmosphere scatters blue light away and you are only left with red light. So in the eclipse the same thing is happening because the light from the Sun is going through a very large segment of the Earth's atmosphere before that light reaches the Moon. Almost all blue light is scattered away and only red light is left.

MatthewJ: Why do large fires and volcanoes affect the eclipse, yet the view from the space station the view is the same as on earth?

*Alphonse\_Sterling:* All the light during the total eclipse is light refracted by the Earth's atmosphere, that is the only thing lighting the Moon at the time. So independent of whether you are on Earth or in space, that is the only light from the Moon that you see.

J: Must have been somewhat shocking for older generations of humans to see a rare red moon. When did we discover what was going on, and what might people have believed before then?

*Alphonse\_Sterling:* Some ancient peoples worked out that it was the shadow of the Earth and that in fact they understood that the Earth was round because they knew the shadow of the Earth was on the Moon and that shadow was always curved. Ancient Greek astronomer Hipparchus understood much about eclipses.

*Moderator\_Brooke:* Our astronomers are asking that you watch the moon for a few moments -- look how close we're getting to totality! <http://www.ustream.tv/channel/nasa-msfc>

Legitimaro: Can an eclipse happen without a full moon?

*Alphonse\_Sterling:* No, for a lunar eclipse, you need a full moon. For a solar eclipse, the moon must be new.

Eacer: So much cloud cover in Memphis, thank you for covering this! Would hate to miss it.. There going to be any more events this year with other planets being close? or possibly solar eclipse?

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*Alphonse\_Sterling:* Sorry Memphis, Huntsville is also clouded out. There will be an annular solar eclipse on April 29, but we will not see it here in Huntsville.

Brandi: Mr. Alphonse and Ms. Mitzi, I want to thank you for answering all our silly (and interesting!) questions! How are you spending this lovely April night? Other than with the rest of us 'Lunatics'?

*Alphonse\_Sterling:* You are very welcome. After the eclipse is over, I will get some sleep!

Scorpion: What is the planet or star that can be seen next to the moon in this eclipse?

*Alphonse\_Sterling:* Spica, the brightest star in the constellation Virgo.

Colombianguy So, if I am in the moon I am seeing a Solar eclipse

*Alphonse\_Sterling:* Yes, but it's not exactly as it does from the Earth because the Earth appears much larger than the Sun. For solar eclipses seen from the Earth, the Moon seems almost the same size as the Sun.

Tarvex: Omg did Mitzi die?

*Alphonse\_Sterling:* No, she was busy doing a phone interview.

Diode: What movement are we observing? The Earth passing between the Sun and Moon, or the Moon's movement in its orbit around the earth, or both?

*Alphonse\_Sterling:* Both.

*Moderator\_Brooke:* On the live feed, the moon has gone red!

Gimbo: Will we see the color phase in the live video feed or just black and white?

*Alphonse\_Sterling:* They just changed the feed to color.

Tersidre: Isn't this particular set of eclipses something that only occurs once every few hundred years?

*Alphonse\_Sterling:* No, there will be eight in the 21st Century. The last tetrad was in 2003-2004 and the next one will be 2032-2033.

Rosebud: Are partial lunar eclipses much more frequent than total eclipses?

*Alphonse\_Sterling:* Yes, just slightly by a factor of 7 to 6 over a span of 5000 years.

Mattcm: Can looking at the eclipse for too long with the naked eye be damaging to the retina?

*Alphonse\_Sterling:* Only for solar eclipses; not for lunar eclipses.

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Teo\_Gr: Hello I want to ask how many times this phenomenon happens? I have heard that happens every year and some they say that happens every 500 years. What's the truth?

*Alphonse\_Sterling:* On average, a lunar eclipse happens every 1.5 years. Over the next two years, we will have two each year.

Wale: can the circumference of the moon be calculated just by observing a lunar eclipse?

*Alphonse\_Sterling:* If you know the size of the Earth and the distance of the Earth to the Moon, then you can do that calculation.

Ranvier: At what time, approximately, should the red being to appear?

*Alphonse\_Sterling:* You should be able to see it now, until the full eclipse ends at 4:23 Eastern time.

Mellobyte: Can you explain the "phases" of a lunar eclipse?

*Alphonse\_Sterling:* <http://www.mreclipse.com/Special/LEprimer.html>

george7452: Why is the shadow tilted at a different angle where I am than the stream's angle?

*Alphonse\_Sterling:* It depends on which way the camera is turned on the telescope.

Derchef: Will the eclipse in October be like this one here?

*Alphonse\_Sterling:* Basically yes, but the locations where it will be seen and the shading colors during the eclipse will be different.

Jade: Hello :) This is probably such a stupid question but, what causes the moon to turn an orange-red hue?

*Alphonse\_Sterling:* Earth's atmosphere refracts sunlight scattering blue light and leaving only red light, so the moon only receives the red light and reflects that back to us.

Carlos: Please let me have the time of the best view of the eclipse

*Alphonse\_Sterling:* Now!!!

Rob: How long will this to happen again?

*Alphonse\_Sterling:* Another total lunar eclipse on Oct. 8, 2014.

Czarkasim: ok i have a question, excuse me another question, i just went outside to take a look and mars looks Amazing, i see Spica down and to the left of the moon BUT i see a blue star or planet right close to the moon, do you know what planet that is????

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*Alphonse\_Sterling:* Spica is a blue-to-white star near the moon. Mars is a red object somewhat farther away. On the other side of the moon from Mars is Saturn. But now that the moon is completely covered, many other stars that could not be seen before will now be visible.

Legitimaro: Why does the moon get brighter on the right side?

*Alphonse\_Sterling:* Because it's being eclipsed from the left.

Karier: Has the eclipse something to do with the fact i can barely see stars?

*Mitzi Adams:* No, as a matter of fact, eclipse should make it easier to see stars. The full moon makes it more difficult because it is so bright -it is a type of light pollution. Any bright lights near you make it more difficult to see stars.

Trig: my sister in Nicaragua is concerned that the eclipse will cause more earthquakes or volcanos to erupt. How can that be?

*Alphonse\_Sterling:* No, it can't.

Jade: Alphonse, can two lunar eclipses occur within the same month?

*Alphonse\_Sterling:* No.

Wonka: Hello, I have a question, I went out earlier at 2:30 am and there was a shadow covering half of the moon, and I just went back out a few minutes ago and now I cant even see the moon!, what happened?

*Alphonse\_Sterling:* It's called a lunar eclipse.

Capt.\_Kirk; is Mitzi married?

*Mitzi Adams:* No, very happily single.

Colombianguy: can I see mars with this eclipse?

*Alphonse\_Sterling:* Yes, a red object not too far away from the Moon.

Ranvier: What is essentially the range of this eclipse? North America in the Northern Hemisphere and South America in the Southern Hemisphere. Do any other continents get to see it? Where would the best viewing location be?

*Alphonse\_Sterling:* Any place on Earth that has night at this time can see this eclipse.

At: Will the next three lunar eclipses be different than tonight's eclipse?

*Mitzi Adams:* Not substantially, the differences will be in duration and color.

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Knipester: so then if it is the shadow from the earth on the moon that is a lunar eclipse what occurs exactly during a solar eclipse? does the moon cast its shadow on the sun?

*Alphonse\_Sterling:* Close, but no, the Moon casts its shadow on the Earth.

andres123456222: why the eclipse color is red and not yellow or whatever?

*Alphonse\_Sterling:* Because all the non-reddish wavelengths of light are scattered away in the Earth's atmosphere.

cassie9735: how do we view the lunar eclipse online?

*Alphonse\_Sterling:* [http://www.nasa.gov/topics/solarsystem/features/watchtheskies/lunar-eclipse-2014.html#.U0zV\\_LweYWm](http://www.nasa.gov/topics/solarsystem/features/watchtheskies/lunar-eclipse-2014.html#.U0zV_LweYWm)

Fhgfd: This year there was a solar eclipse or not

*Mitzi Adams:* yes there will be an annular eclipse on April 29, but it will not be visible in U.S. only in parts of Australia and Antarctica. Another partial solar eclipse Oct. 23 viewable in North America.

the\_marsh: An absolutely beautiful view from the clear skies outside here in Salt Lake City, Utah!

*Mitzi Adams:* Glad to hear some can view eclipse real time.

RichHoagland: why was there a 300 year gap with no bloodmoons ??

*Alphonse\_Sterling:* Eclipses are quite common. There was a 300 year gap between tetrads, a series of four eclipsers consecutively, between 1600 and 1900. That's just a consequence of the cyclical motions of planetary bodies.

Czarkasim: thank you Al for the answers about the ancients, So the Earth is getting a lunar eclipse and the moon is getting a solar eclipse?

*Alphonse\_Sterling:* Yes.

Questionz: Is it over?

*Mitzi Adams:* No

Luizzfer: any kind of electromagnetic disruptions expected, remotelly resembling those from solar storms?

*Mitzi Adams:* No

Sarahsue: sterling do you like working at NASA is it hard work?

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*Alphonse\_Sterling:* Yes to both!

Ponchomayto: I wish I had a telescope

*Mitzi Adams:* You don't need one to view an eclipse like this. Just clear skies!

Milehighmoon: thank you!!

*Mitzi Adams:* You are welcome!

Cdfdfd: Chicago snowstorm won't allow me to see it in person :(

*Mitzi Adams:* Understand - it is raining here in Huntsville, AL.

the\_marsh: What properties of the atmosphere cause it to filter blue light?

*Alphonse\_Sterling:* It doesn't filter it; it scatters it. The particles that make up the Earth's atmosphere have the appropriate cross-sectional size to scatter the blue wavelength of light.

Renegado: En colombia no se ve

*Mitzi Adams:* En Colombia es posible, si no hay nubes y lluvia

Rallok: it looks like its already ending

*Mitzi Adams:* We are at mid-eclipse another roughly half hour until totality.

Jade: So during this lunar eclipse, does this happen due to the fact that the sun, moon, & Earth are perfectly aligned?

*Alphonse\_Sterling:* Basically yes. And so the Moon falls into the shadow of the Earth.

Trinidad186: Queria saber si se podran ver otros planetas

*Mitzi Adams:* Si Mars, Jupiter and the west , Saturn in the east and Venus in the east just before sunrise.

Fhgfd: Why does the moon turn red?

*Alphonse\_Sterling:* Earth's atmosphere refracts sunlight scattering blue light and leaving only red light, so the moon only receives the red light and reflects that back to us.

qb1120: I heard we can see Mars too. There's a bright spot that looks like a star near the moon, is that it?

*Mitzi Adams:* The blue white star like object below the moon is Spica, the brightest star of the constellation Virgo. Mars is the reddish star like object above the moon.

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Jesus: as it is called this star to the right of the moon the brightest

*Alphonse\_Sterling:* If the object is blue-ish, it's the star Spica; if it's reddish, it's the planet Mars.

DCalhoun: Thank you again NASA, from rainy Georgia, for this stream.

*Mitzi Adams:* From rainy Huntsville, Al., you are welcome! Wish we had clear skies.

Mike\_Deaner: WHAT WOULD AN ASTRONAUT SEE STANDING ON A BLOOD MOON?

*Mitzi Adams:* An astronaut standing on moon would see a solar eclipse - of sorts.

Cryaotic: Excuse me but, why is it red? I saw something next to the moon, looked like a UFO...

*Mitzi Adams:* That was probably Spica.

MaryEllen: Has the moon ever appeared to be another color? Other than red right now

*Alphonse\_Sterling:* Some peculiar states of the Earth's atmosphere, such as volcanoes or large fires, can throw particles into the high atmosphere of the Earth and that can cause the moon to have different colors.

DCalhoun: Will October's eclipse be viewable in North America again?

*Mitzi Adams:* Yes

Ichow: Do the astronauts on ISS also see it red?

*Alphonse\_Sterling:* Yes, when they are in the proper position in their orbit around the Earth.

Karla: Where is Mars in relation to the moon? I am understanding we are supposed to be able to see it as well. I thought at first it was that planet you called Spica.

*Mitzi Adams:* Look above the moon for a red star-like object.

Kip: So this tetrad will be all red?

*Alphonse\_Sterling:* Any time there is a lunar eclipse, the moon turns a reddish color. There is nothing especial about the Moon during a tetrad. So the Moon will be red during each of the four tetrad eclipses.

RichHoagland: why 300 years without a bloodmoon would be the most interesting thing i could ever learn ? thanks

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*Alphonse\_Sterling:* There were lunar eclipses, just not tetrads. Lunar eclipses are red independent of whether they are part of a tetrad. The 300 years of no tetrads was just a consequence of orbital mechanics.

Mattjackson: Where does the red color come from? Are they the only wavelengths that make it around the atmosphere?

*Alphonse\_Sterling:* Earth's atmosphere refracts sunlight scattering blue light and leaving only red light, so the moon only receives the red light and reflects that back to us.

Chris: Cannot see in the Middle East, the pic I have looks like a Normal Full moon, am I late or early?

*Alphonse\_Sterling:* No eclipse will be visible in the Middle East.

Zeke: Does this lunar eclips happen this time every year? when is the next one?

*Alphonse\_Sterling:* No, it does not happen at the same time every year. The next will one October 8, 2014.

Laevateinn: Thank goodness for live streaming online. It's very cloudy here in the northeastern USA.

*Mitzi Adams:* Yes! It is cloudy and raining here in Huntsville, Al., too.

Wesley: love eclipse <3

*Mitzi Adams:* We do too!

Zdollaz: What spell do I have to cast to get rid of these %%%% clouds?

*Mitzi Adams:* Expelliamus?

Noam: IS the Lunar Eclipse still in the sky?

*Mitzi Adams:* Yes, we think so.

Mike\_Deaner: WHAT WOULD AN ASTRONAUT SEE STANDING ON A BLOOD MOON?

*Alphonse\_Sterling:* He would see a dark Earth covering the Sun and the Earth would have a bright red rim around it. That's the Earth's atmosphere bending the light from the Sun around it.

Winkypop: How long ago was this phenomenon recorded in the science world?

*Alphonse\_Sterling:* At least 3000 years ago by the ancient Chinese. Maybe longer than that because some of their records were destroyed.

Bolt: what does it look like from the dark side of the moon?

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*Mitzi Adams:* There is no dark side of the moon, because the moon actually does rotate. When the moon is full the side opposite is dark, but when moon is new that same side faces the sun.

Dee\_De: What causes the moon to be red?

*Alphonse\_Sterling:* Earth's atmosphere refracts sunlight scattering blue light and leaving only red light, so the moon only receives the red light and reflects that back to us.

Asdf: Does the eclipse have any impact on Earth besides the cool colors for viewing?

*Alphonse\_Sterling:* No, none.

AlexIncnkc: In what year we will see a solar eclipse in North America??

*Mitzi Adams:* August 21, 2017 the path of totality goes through Nashville, Tennessee and other parts of North America.

Eduardo1842: Hi *Mitzi Adams*:, is necessary have a good equipment to see the eclipse??

*Alphonse\_Sterling:* It's necessary to have clear skies and no rain.

Gapn: when are we going to see an eclipse like this again?

*Mitzi Adams:* Yes, in October on the 8th.

nasa111: Have you always been iterested in astronomy and science and mathematics since you were in school?

*Mitzi Adams:* I have been interested in astronomy since the third grade.

I\_Luv\_Huskys: ive asked a question but it hasn't been answered yet. is there a good way to view the eclipse with binoculars

*Alphonse\_Sterling:* Yes. Point them at the Moon and look.

Teslanator: When will it be at its peak? or has it already (just woke up)

*Mitzi Adams:* It has already happened.

Gary\_: How does the moon cast a shadow on earth without the sun?

*Alphonse\_Sterling:* In a solar eclipse , the Moon is between the Sun and he Earth, so the light from the Sun causes the Moon to have a shadow and that shadow falls on the Earth.

Mthunder: Hi, I'm watching the moon in California! It's brownish-red and looks amazing. How long is the total ecclypse expected to last?

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*Mitzi Adams:* Totality has ended. Partial phase will end in an hour - around 4:30 CDT.

Asdf: Does the eclipse have any significant impact on Earth besides the cool colors for viewing?

*Alphonse\_Sterling:* No more than any normal full moon.

PakistaniPlatypus: when will the next full lunar eclipse happen?

*Alphonse\_Sterling:* 08-Oct-14

MarcoBrasilAcre: After the next three eclipses, how long it will take to another bloody moon occur?

*Mitzi Adams:* The next set of four will be 2032.

Zachary1: I thought solar eclipses were not viewable with the naked eye

*Alphonse\_Sterling:* Solar eclipses can cause damage if viewed by the naked eye; lunar eclipses do not.

connet If the Earth had no atmosphere, would the moon be black, or does gravity "weigh" in on light refraction?

*Mitzi Adams:* The moon would be black if the Earth had no atmosphere. Gravity would not have an effect unless the Earth was extremely massive as in star sized or a black hole.

They: Does this confirm or deny the cheese theory that states the moon is made out of cheese?

*Mitzi Adams:* I've not seen any red cheese! 😊

Astrop: How do you determine mathematically future times in which the moon lies in the same plane as the Earth and Sun?

*Alphonse\_Sterling:* All the motions are extremely regular and they are governed by fundamental physics equations. Since we know the properties of these celestial bodies well, we can use the equations to figure out their future locations accurately.

Klkjlk: can the men that are at the spacial stations can see this?

*Mitzi Adams:* Yes, when they are also in the Earth's shadow.

Asdf: Does the eclipse change the amount of UV light reflecting back to Earth right now? Or would it be the same w/o an eclipse?

*Alphonse\_Sterling:* Not measurably.

Alexhkk: ¿Cuantos idiomas hablan hah?

*Mitzi Adams:* Only one fluently.

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Brandi: why does the duration and color of the eclipses vary? Can you tell in advance how long they will last?

*Alphonse\_Sterling:* There are many reasons. One example is that some eclipses, the Moon is closer to the Earth than in other eclipses. And yes, we can tell very accurately in advance how long an eclipse will be by using the equations of physics.

SagCos: When will be the next time we will see a Lunar Eclipse with the "blood moon"?

*Alphonse\_Sterling:* 08-Oct-14

Faxmid: Una hermosa vista desde la peninsula de yucatan =)

*Mitzi Adams:* Muy bien!

Amilcar: Nice to see that you speak Spanish. Grats

*Mitzi Adams:* I don't speak Spanish very well, but I try.

Gerardo: morning, when was the last time that an eclipse like this took place?

*Mitzi Adams:* The last time was Dec. 21, 2010.

UPEGUI: Hello, I am writing from cali - Colombia, the question is addressed to the NASA astronomer Mitzi Adams and astrophysicist Alphonse Sterling. the reason to study what they play today? and how important this event is for you? Thanks ... for taking this space.

*Alphonse\_Sterling:* Lunar eclipses are well understood, so we do not now need them to learn about the Moon or the Earth. We can learn a little about the Earth's atmosphere, but mainly they are now a phenomena to enjoy. In the past, lunar eclipses were very important for understanding things such as the shape of the Earth. On the other hand, solar eclipses are still useful for learning about some scientific aspects of the Sun's atmosphere.

Chris: the next eclipse in october, will that be red also?

*Mitzi Adams:* Yes, if there is a volcanic eruption it will be a much deeper red.

*Moderator\_Brooke:* Hi everyone -- wow, what a busy chat this has been! We're coming up on the last 10 minutes of our four-hour chat. If you have any last questions, now is your chance!

Edd: Is there a few more eclipses that will be happening this year? Particularly any in the summer?

*Alphonse\_Sterling:* The next total lunar eclipse will be October 8, 2014

bp\_968: mitzi adams your in huntsville AL? Do you know my cousin Jason Cassibry? He's a professor of aerospace engineering at UAH and has worked with NASA on the pulsed fusion stuff. :)

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*Alphonse\_Sterling:* No, sorry.

Mon: HI, we saw about 40 min ago something simmilar to a comet from Mexico, it was quite huge... any idea what it was? thank you!

*Mitzi Adams:* Most likely a meteor or fireball- which are pieces of dust or debris that enter Earth's atmosphere and burn up in seconds. Comet orbit the Sun and can be seen for many nights.

*Moderator\_Brooke:* And -- that's a chat! We appreciate all of your questions and participation so much. Your enthusiasm is what makes us love doing these events. Thanks to Mitzi and Alphonse for all of their time and talent tonight. Check back in a few days for a transcript of the chat. We're also hoping to rebroadcast the Ustream feed of the eclipse. Have a great Tuesday, you night owls. Get some sleep, and we'll see you soon.