Published Edit

This is a graded discussion: 10 points possible

Show Due Dates

D1(BH) Weekly Discussion

Erin O'Connor

Jan 17 at 3:17pm

1 55

Due this week

First, be sure to do the reading and watch the lectures:
Assigned reading and lectures

Then answer the following questions in this discussion forum (and yes, you may look to see what others write, but try to find what they might have missed and you should go back to the original reading and lectures to get answers for yourself). Then post your own question at the end, and then answer someone else's question. If no question is available, go ahead and check back later until the due date. If nothing comes available you can then pick any question you wish.

We hope to emulate a seminar classroom environment where students can share ideas. Always be respectful with all communications you have with your esteemed fellow colleagues (your fellow students) in this course.

- 1. DISCUSS in some detail something you found unusually interesting or intriguing in the reading or lecture material. Are there new insights that you have gained (something you had not thought of or considered before)? Focus on one of the concepts and explain as best you can in your own words. (4 pts)
- 2. Post a question that you have about something you read. Be sincere. What do you want to know? Write the word QUESTION all in caps, so that your fellow classmates know what your proposed question to the class is. (3 pts)
- 3. ANSWER the question of another student according to what we discussed in the lectures or what you read in the assigned readings (don't just make something up). Try to answer a question that no one else has responded to yet (but not a hard and fast rule). A good way to respond to another student's question would be to say something like, "Good question! The answer can be found on page..." and give the quote from the reading. You are free to reference other sources outside of class material, but always consider the credibility of the source, state what the source is, and give the link. (3 pts)

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Reply

Maura Pittenger (https://canvas.sbcc.edu/courses/46681/users/131447)

Jan 25, 2022

Is this where the discussion is?

Reply

Erin O'Connor (https://canvas.sbcc.edu/courses/46681/users/24247)

Jan 25, 2022

Haha... Yep!!! I guess no one knows where it is. Thank you for helping me show everyone!

Reply

Hana Putnam (https://canvas.sbcc.edu/courses/46681/users/427074)

Jan 26, 2022

During this week's reading/lecture, I found myself in awe of the courage and confidence of scientists. Galileo was so certain of his support of the Copernican geo-centric theory that he faced life-altering repercussions and yet persisted because he couldn't shake the truth that "Eppur si muove". It must have taken a lot of courage to stand behind this assertion, not only for the effects on his personal life, but also for the repercussions it had in his professional field. Questioning the accuracy of mentors is never easy and to make an assertion seemingly well outside of what is accepted likely wasn't easy. Especially given that, at least initially, the heliocentric model didn't appear to explain orbits as accurately as the geocentric model.

QUESTION:

I had a really hard time understanding the discussion on infinite static model vs. finite model of the universe. On pg 6 of "A brief history of time" Hawking says that an infinite number of stars that were all attracted to one another would fall in on themselves and that if we consider a finite number of stars and add additional stars, this problem is not solved. He later says, "we now know it is impossible to have an infinite static model of the universe in which gravity is

always attractive". I don't understand why this is the case...if we added additional stars that each had their own gravitational attractive force but that were on opposite sides of each other in space, wouldn't the result be a net zero force on the body in the middle?

Reply

(http

Erin O'Connor (https://canvas.sbcc.edu/courses/46681/users/24247)

Jan 27, 2022

That's a great question, and a good example of how complicated some of these concepts can be. In this class, we don't do a rigorous mathematical analysis of these things, but do build on the knowledge and wisdom of these great scientists in helping us understand the big concepts. In this case, the way to think about this is in terms of stability. It is true that by having all the stars infinitely distributed in space in all directions would balance out all the forces, but if just one star was a bit closer to another star than the average distances of all the others, those two stars would fall together (or clump together). Since stars are moving around, eventually all stars would clump together. Another more "Earthly" example would be if you are balancing a stick on your nose. You can perhaps balance it for a bit, but even if there is the tiniest wind, it will begin to fall (unless you move to compensate). That's an "unstable" equilibrium, and in a similar way, this infinite distribution of stars would be unstable as well. Great question, and I'm sure you (and others) will have more as the class progresses. We'll do our best collectively to try and understand what we can from the ideas of these great scientists.

Reply

(http

Sarah Savage (https://canvas.sbcc.edu/courses/46681/users/375381)

Jan 29, 2022

ANSWER/DISCUSSION:

Hi Hana! While reading Ch. 1, I had written down the exact same question you posted about infinite vs finite models, which led to my next question: when is gravity NOT always attractive?! That idea is mind boggling. The suggestion feels like someone telling me that water isn't wet. I thought gravity was ALWAYS attractive. Hawking clearly didn't get into this in greater detail other than to say that it has been "attempted to modify the theory by making the gravitational force repulsive at large distances." I'm guessing this would be something learned in astrophysics or a higher math class. I'm now wondering a bit about how the Crash Course video talked about how an object needs both mass AND an upward force from the ground in order for us to have weight. Perhaps if the upward force exceeds the amount of force needed to give the object weight then the object would be

repelled...sort of like a gravity "escape velocity"? But maybe that doesn't make sense at all. Being repelled by gravity certainly sounds like science fiction!

Edited by Sarah Savage (https://canvas.sbcc.edu/courses/46681/users/375381) on Jan 29 at 6:50pm

Reply

(http

Erin O'Connor (https://canvas.sbcc.edu/courses/46681/users/24247)

Jan 30, 2022

Hi Sarah. That was a well thought out response. Something we will learn about later is Einstein's "Cosmological Constant". Even Einstein couldn't reconcile these very questions that you Hana and you are asking, and he even modified his General Theory of Relativity to introduce a mysterious "repulsive" force to help balance out the universe. Later, he is reported to have said that was the biggest error of his career. The principle of Occam's Razor suggests that one should always choose the model that answers the questions with greatest simplicity, and adding mysterious non-existant forces only complicates things. Oddly enough, in modern cosmology, scientists have once again re-introduced a repulsive force referred to as "dark energy". These are all things we will discuss further later in the class.

Reply

(http

Sarah Savage (https://canvas.sbcc.edu/courses/46681/users/375381)

Jan 30, 2022

Thanks for the explanation. I'm looking forward to hearing more!

Reply

(http

Erin O'Connor (https://canvas.sbcc.edu/courses/46681/users/24247)

Feb 3, 2022

It's a bit confusing, but Einstein's Cosmological Constant isn't gravity, it's some "other" thing, so it's not saying gravity would be repulsive. Gravity is always attractive (as you thought). But that's a bit of a mystery as to why since electrostatics have + and -, and magnetism has N and S, but gravity doesn't have two things.

Reply

(http

Sarah Savage (https://canvas.sbcc.edu/courses/46681/users/375381)

Feb 4, 2022

That is interesting. I hadn't thought about the fact that gravity doesn't have opposites like electrostatics and magnetism!

Reply

Luke Rutherford (https://canvas.sbcc.edu/courses/46681/users/373514)

Jan 27, 2022

DISCUSSION:

After reading chapter one of "A Brief History of Time" I was intrigued about scientific theory, specifically how hypotheses can never be proven. I never thought about how there can always be an observation that clashes with the currently accepted theory. I guess it is shown in history when the heliocentric model of the universe went against the accepted geocentric model. Theories can only be driven by observations but what happens when we look at something like dark matter? We know there is something with mass there but it can't be directly observed. I always thought of a hypothesis as a theory that has been proved but I see how the expansion of knowledge can disprove what was previously thought.

QUESTION:

At the top of page 5, Hawking states that Edwin Hubble noticed that galaxies are quickly moving away from us. How would Hubble know this? I am confused because I would imagine an observation like this would take time to notice (though I don't know the universe's rate of expansion). Is this observation a result of the COBE?

Reply

Sarah Savage (https://canvas.sbcc.edu/courses/46681/users/375381)

Jan 29, 2022

DISCUSSION:

Interesting thoughts, Luke. I suppose we only hypothesize that dark matter exists. Scientists have observed that *something* is having a gravity-like effect on matter, so we assume it must be an unknown type of matter and we assume it must have a mass because I think we've never seen anything else have that kind of effect without having mass. So I think that the existence of dark matter is just a hypothesis and that in order for it to become a theory we'd need to figure out a way to directly observe it. I had thought of a theory as something that is concrete, but science is always making new discoveries and

alter what we thought we knew for certain. So then I suppose that a theory is just the best we can do at a certain point in time with the methods that we have to explain a phenomenon.

ANSWER:

I'm not sure of Hubble's exact method used to figure out that galaxies are moving away from us, but I do know that astronomers can tell if an object is moving toward us vs. away from us based on whether the object's electromagnetic spectrum has a red shift (moving away) or a blue shift (moving toward). This is related to the Doppler Effect. Here's a video explaining what that is: https://www.youtube.com/watch?v=mx2M_ZKXM_c

Edited by Sarah Savage (https://canvas.sbcc.edu/courses/46681/users/375381) on Jan 29 at 7:22pm

Reply

(http

Erin O'Connor (https://canvas.sbcc.edu/courses/46681/users/24247)

Jan 30, 2022

Hi Luke. Great thoughts and good question. Something we will talk about later is dark matter and dark energy. Evidence seems to suggest that there may actually be "something" there for dark energy. Two possibilities are MACHOS and WIMPS. MACHOS are "Massive Compact Halo Objects", and WIMPS are "Weakly Interacting Massive Particles". Antother theory is that dark matter is the gravity leaking in from parallel universes.

Reply

(http

Erin O'Connor (https://canvas.sbcc.edu/courses/46681/users/24247)

3:56am

Originally Posted 2/3/22

Yes, most people think of theories as something you "prove", not "disprove".

Hubble used redshift, and you have it exactly right. Newtons law of Gravity works just fine except for the most extreme situations where small particles travel near the speed of light.

Reply

(https:/

Sarah Savage (https://canvas.sbcc.edu/courses/46681/users/375381)

Jan 29, 2022

DISCUSSION:

I have to admit that Chapter 1's 2nd paragraph already had me stopped and contemplating things! The suggestion of "turtles all the way down" is hysterical, but what do we really know? What "essential truth" do we think we know now that will soon be disproved? So many people lived and died thinking that the geocentric model of the universe was correct. The idea that modern physics could be completely disrupted by a new discovery is both terrifying and exciting, and maybe this will happen after our lifetimes so we'll never know it. This thought has me imagining scientists, teachers, and schools scrambling to correct what we thought we knew, and how would this trickle down to have an effect on our daily lives and the economy? Another thought is on how science builds upon itself...what if humans have been following the wrong breadcrumbs and we're already way off base with no hope of correcting our path to the truth?

Looking at the the different models of the universe, I would love to know what models existed before Aristotle. What did the ancient Egyptians or Mayans think? Perhaps this knowledge is lost with time.

Reply

(http

Brian Wolden (https://canvas.sbcc.edu/courses/46681/users/274832)

Jan 29, 2022

Hi Sarah,

I too often wonder about what assumptions that have about the nature of reality or even just the world around me might be based on wrong assumptions or incorrect for some other reason. When it comes to science, I try to keep in mind that it is a process of getting closer and closer to truths about the universe and reality and it seems as though the picture, while still very hazy, becomes much clearer over time. At the very least, science seems to be the best tool we have to evaluate theories and make predictions about the world around us.

ANSWER

I have read about several metaphysical theories from Greek philosophers before Aristotle. Thales, for example, is often considered the first Greek philosophers and thought that water was the foundation of everything and that all things came from it. While some of his ideas about the world, such as that earthquakes were the result of the world resting on top of a giant body of water, seem a little silly. However, it was a step up from many previous explanations of various phenomena which were often just attributed to the Gods.

Here is a link to the Wikipedia entry on Thales:
https://en.wikipedia.org/wiki/Thales_of_Miletus (https://en.wikipedia.org/wiki/Thales_of_Miletus)

Unfortunately, I don't know much about Mayan or Egyptian metaphysical theories though I believe that, as far as we know, they too relied heavily on Gods for explanations of existence and the laws of the universe.

Reply

(http

Sarah Savage (https://canvas.sbcc.edu/courses/46681/users/375381)
Jan 30, 2022

Brian, thanks for the link about Thales. I will check that out!

Reply

(http

Erin O'Connor (https://canvas.sbcc.edu/courses/46681/users/24247)
Jan 30, 2022

Hi Sarah. I love how you said that finding a new "disruptive" discovery is both terrifying and exciting. But humanity must embrace knowledge, the pursuit of knowledge, and the discoveries to be made. We must always move forward, not backward. Your analogy of "following the wrong breadcrumbs" is also very good. Perhaps we may follow the wrong bread crumbs for a bit, but if we adhere to the principles of the scientific method, we should eventually see that our direction is wrong and correct for that. The process may be slow, but it will eventually get us there, just like in geology continents only move a few inches a year, yet over millions of years, we have moved thousands of miles.

Reply

(http

Sarah Savage (https://canvas.sbcc.edu/courses/46681/users/375381)
Jan 30, 2022

Erin, your geology analogy is a great one, thanks!

Reply

(http

Abigail Jacobs (*She/Her*) (https://canvas.sbcc.edu/courses/46681/users/367167)
Jan 30, 2022

Hi Sarah!

I think that's a great question and it would be interesting to see their reactions to what knowledge we have now and the theories that we have created over time. I would assume that they knew of the stars, our planet, the moon, and the sun. As they didn't have the technologies to see beyond the naked eye.

Reply

(http

Abigail Jacobs (*She/Her*) (https://canvas.sbcc.edu/courses/46681/users/367167)

Jan 30, 2022

https://www.jstor.org/stable/25152883 (https://www.jstor.org/stable/25152883)

I actually found an article that goes into their ideas and one of the main ideas is that the universe and cosmos depended on them!

Reply

(http

Sarah Savage (https://canvas.sbcc.edu/courses/46681/users/375381)

Feb 4, 2022

Wow, that is a crazy concept to consider. Thanks for looking this up!

Reply

(http

Erin O'Connor (https://canvas.sbcc.edu/courses/46681/users/24247)

3:57am

Originally Posted 2/3/22

Great participation and super questions.

Reply

(https:/

Brian Wolden (https://canvas.sbcc.edu/courses/46681/users/274832)

Jan 29, 2022

DISCUSSION

One thing I found particularly interesting is how accurately the Ptolemaic model was able to predict planetary motion given how inaccurately it described the structure of the solar system. I believe that, in the lecture, it was said that the Ptolemaic model more accurately predicted planetary motion than that of Copernicus, despite Copernicus' model being much closer to what we now know to be the correct model of our solar system. This is interesting to me in part because of the huge amount of work that would have been required to come up with such a complicated model. Even though it was incorrect, it shows that Claudius Ptolemy was clearly very clever and determined. More importantly, this really shows the value and even necessity of philosophical tools like Ockham's razor when evaluating scientific theories. By use of such principles we can evaluate two different theories that have similar or identical predictive qualities. We can now also see the value of such principles as the simpler model and theory was ultimately more accurate.

QUESTION

Chapter 1 of Hawking's book talks about how we still use Newton's theory of gravity for most calculations (rather than general relativity) because it is simpler and works well enough for the situations we normally encounter. My question is, at what scale or level of accuracy does it become necessary to switch to using general relativity? Is this necessary for anything we might practically do within our solar system? For example, how minor are the differences in Mercury's orbit and would it be necessary to use general relativity to accurately send objects to it?

Reply

(http

Erin O'Connor (https://canvas.sbcc.edu/courses/46681/users/24247)

Jan 30, 2022

Hi Brian. Something else to consider (and be in awe of) is that Ptolemy and Copernicus and Kepler were all doing these elaborate calculations without the aid of calculators or computers. All done by hand (and slide rules).

Regarding your question of when do "relativistic effects" become significant, so that you can't ignore them and just use Newtons approximations. Turns out that the conditions are extreme. A spacecraft would need to be traveling at near the speed of light for these effects to become noticeable and meaningful. Since our spacecraft don't, we have no need for these minute adjustments to the calculations. Our spacecraft travel at most 20-30 miles/sec, but light travels at 186,000 mi/sec.

Reply

(http

Luke Rutherford (https://canvas.sbcc.edu/courses/46681/users/373514)

Jan 30, 2022

Hi Brian,

To my understanding, Newton's theory of gravity is highly accurate and is used over general relativity because of how complex it is to compute. Also, there is a mathematical incompatibility when plugging Newtonian equations into the structure of special relativity. I found this: "The first post-Newtonian correction due to relativity is comparable in magnitude to the square of this value, which is about 5×10^{-19}. A tiny, tiny, tiny number." This statement is from Viktor Toth, an IT author so I don't know his credibility or the accuracy of the claim.

Reply

(http

Naomi Xu (https://canvas.sbcc.edu/courses/46681/users/27955)

Jan 30, 2022

ANSWER

If you were on top of Mt. Everest then it would be more accurate to use general relativity, I can't give you the exact height where it would start to affect the gravity, nor can I source it, because this was the example my physics teach gave us.

Reply

(http

Erin O'Connor (https://canvas.sbcc.edu/courses/46681/users/24247)

4:02am

Originally Posted 2/3/22

Great posts, questions, and response. I see you are a deep thinker. This is definitely the right class for you.

About Mercury's orbit, we wouldn't need to use Relativity to send spacecraft there, BUT general relativity does cause the orbit to precess. I can explain sometime, but that effect, over many years, does become obvious and is only explained by using relativity equations.

Reply

(https:/

Abigail Jacobs (*She/Her*) (https://canvas.sbcc.edu/courses/46681/users/367167)

Jan 30, 2022

Through our reading, I found many things very interesting but most of all the Static Universe Theory.

The idea of the static universe is very interesting to me, according to “German philosopher Heinrich Olbers wrote about this theory in 1823. In fact, various contemporaries of Newton had raised the problem, and the Olbers article was not even the first to contain plausible arguments against it. It was, however, the first to be widely noted. The difficulty is that in an infinite static universe nearly every line of sight would end on the surface of a star. Thus one would expect that the whole sky would be as bright as the sun, even at night.”(Hawking, p. 6)

There are also counterarguments made by Olber “ the light from distant stars would be dimmed by absorption by intervening matter. However, if that happened the intervening matter would eventually heat up until it glowed as brightly as the stars.”(Hawking, p. 6). I think this idea is so cool because the thought of our planet being as bright as the sun is unimaginable, when you think about looking up at the sun during the day it hurts your eyes. If the whole planet was like that it would be crazy.

QUESTION

How would the Static theory affect our daily lives? How would it change the natural resources we have on the planet?

Reply

(http

Franco Diaz Campo (https://canvas.sbcc.edu/courses/46681/users/403036)

Jan 30, 2022

Hi Abigail!

I find your question very interesting, so I decided to search its primary use in our daily life and what it affects. One of the primary uses it has, which most of us use, is printers and photocopiers; what happens here is that static electric charges attract the ink to the paper.

There are a lot of many uses, but I think this is the easiest one to understand the definition of it.

Thanks,

Franco.

Reply

(http

Alak Fryt (*He/Him*) (https://canvas.sbcc.edu/courses/46681/users/354278)

Jan 30, 2022

Hey Abigail, I think your question is very interesting and I think there are a couple of different ways to look at it from. My first thought when considering your question was from the perspective that it was just the planet itself that was bright and emitting as much light as the sun. In that case I'd like to think that scientists and researchers would come up with a way to harness our own energy from the planet rather than needing to use solar panels and such to produce energy and perhaps act as our own sustaining energy source. But if we were to consider that the earth was as bright as the sun for the same reason that the sun is so bright, we'd have to consider why the sun is so bright which is because of its temperature, size, as well as nuclear fusion. The most interesting thing to me if we were to consider this perspective is to think about the earth being as big as the sun, I feel like it would be like discovering whole new worlds traveling from continent to continent which is crazy to think about.

Reply

(http

Lucca Gambone (https://canvas.sbcc.edu/courses/46681/users/405319)

Jan 31, 2022

Hey Abigail I was thinking about your and I found another way static theory is in our daily lives. When you rub nylon clothes against lets say skin or another fabric static electricity is formed.

Reply

(http

Erin O'Connor (https://canvas.sbcc.edu/courses/46681/users/24247)

3:55am

Originally Posted 2/3/22

Yes, it would be cool to have the Earth as bright as the sun, but it also means that the temperature would be 6000K or about 12,000 deg F, so we could not live on it. It wouldn't just be light, it would be heat which would cause it to glow. Good think we have a dark sky afterall.

Reply

Sean Fox (*He/Him*) (https://canvas.sbcc.edu/courses/46681/users/50705)

Jan 30, 2022

DISCUSSION:

I had never heard of Olbers' Paradox until this week's reading. It's something I've never thought about, most likely because some introductory astronomy and the traveling of light were included in some of my science classes in elementary school. It's interesting to learn that Oblers' Paradox was another situation that led to people pondering the beginning of celestial phenomena.

QUESTION:

How is it not known what length a stadium was? If it was a common unit of measurement, there must have been some physical measurement for it like our modern units. I'm assuming they have just been lost to the elements over the millenia, or that maybe it wasn't a unanimously agreed upon length?

Reply

Franco Diaz Campo (https://canvas.sbcc.edu/courses/46681/users/403036)

Jan 30, 2022

DISCUSSION

One of the things that caught my attention about all the readings and videos this week is the Ptolemaic model. To us, this idea may sound pretty crazy, and it may not make any sense. Still, it was reasonable for all the people of that time since they did not have enough resources to investigate more than they could in those times. Since the great scientists said that this model was correct, people believed it was so for many years, but this is not something that we

can make fun of since the universe is immense, and we can be wrong in many things we think to believe.

QUESTION

Do you think we will have more technological advantages than we have today and, therefore, have more knowledge and security on the theories we have in the future?

Reply

(http

Lexie Brent (https://canvas.sbcc.edu/courses/46681/users/122267)

Jan 30, 2022

Hi Franco!

First off, I want to say I had a similar thought about Ptolemy's theory and how it can seem very odd to us now. But as I thought more about it, I realized if I put myself in the shoes of someone who lived long before us and our modern thinking and furthered knowledge, I can see myself believing his theory. For what else was there to believe but other theories even further from the truth?

To respond to your question, I think as long as humans are around we will continue to advance technologically. To tie back to your original thought though, this new technology could be advantageous to us in showing us how our current theories are wrong, just as Ptolemy's was. Even though people believed in Ptolemy's model for a long time, it was still proven to be wrong as new information was discovered. I think there's no way to know if we will have more security in our scientific theories as we as a society progress and become more knowledgable. The knowledge we obtain in the future could change our perspective on everything we think we know now and even reverse our feeling of security.

Reply

(http

Lukas Gott (https://canvas.sbcc.edu/courses/46681/users/417976)

Jan 30, 2022

Hi Franco! I think that we as a society are guaranteed to scientifically advance as we've done throughout history. Therefore I'm sure that technological improvements will bring about a greater understanding of space and we'll have more clarity regarding certain theories.

Reply

(http

Erin O'Connor (https://canvas.sbcc.edu/courses/46681/users/24247)

3:51am

Originally Posted 2/3/22

I think with more technology and access to information, also comes more confusion and being overwhelmed by information (the whole fake news thing).

Reply

(https:/

Alak Fryt (*He/Him*) (https://canvas.sbcc.edu/courses/46681/users/354278)

Jan 30, 2022

DISCUSSION:

So I had taken Earth 101 last semester and so all of the material that I read in Chapter 1 was familiar to me, but it was a nice refresher. One concept that I think is extremely interesting is about what Newton questioned about the stars. He questioned why the stars wouldn't fall to one certain point after a period of time if they are really attracted by gravity. Newton then proposed the idea that instead there are an infinite number of stars, because in that case there wouldn't be a central point for the stars to fall to which I think is just wild. Of course you can think about this in a surface level way and just understand that this is how it is, but if you really start to think about it, this idea is just absolutely absurd. But that's just how space is, absolutely insane and such a beautiful mystery.

QUESTION:

So I understand that the universe is expanding faster and faster and that there are three theories so far for the end of the universe which are the Big Rip, Crunch, and Freeze. I'm curious as to what seems to be the most likely of the three.

Reply

(http

Erin O'Connor (https://canvas.sbcc.edu/courses/46681/users/24247)

3:52am

Originally Posted 2/3/22

I think the universe is very close to being "Flat". Everything would work out nicely then (in terms of balance of energy).

Reply

Malachi Scott (https://canvas.sbcc.edu/courses/46681/users/409981)

Jan 30, 2022

Discussion: The biggest outlying thing I discovered during this set of material was the accuracy yet simultaneously inaccuracy of the Ptolemaic Model. It managed to predict planetary motion which is huge when you truly begin to consider the technology they had at the time. Although, it was clearly very far off in regards to the structuring of the solar system. this was extremely interesting to me and I related it in my mind to the importance of the differences, accuracies & inaccuracies of the the heliocentric and geocentric models of our solar system

Question:

How come visible light and radio wave telescopes are the only ones that work without error at the surface of the earth

Reply

Lukas Gott (https://canvas.sbcc.edu/courses/46681/users/417976)

Jan 30, 2022

DISCUSS: I found it really intriguing that Newton began questioning ideas about gravity once he had discovered his own rule of gravity. His idea that unless there is a infinite amount of stars than all the stars would pull themselves together due to gravity is what really interests me. So while I'm definitely still working to remotely understand most of the rules of gravity, my limited knowledge growing up tells me that stars are moving, even though I may be wrong. Yet in that case I guess my question is....

QUESTION: From my knowledge, stars are constantly moving throughout space randomly. Yet how is it possible for stars to move at all in space if they're being pulled by an infinitely random gravitational pull as Newton suggested?

Reply

Sarah Savage (https://canvas.sbcc.edu/courses/46681/users/375381)

Feb 4, 2022

Stars are definitely moving through space, but not randomly. A star is orbiting around a galaxy in an organized way that is caused by the gravity of the black hole at the center of each galaxy. It holds the whole thing together so that stars aren't moving randomly or independently around the universe.

Reply

(http

Erin O'Connor (https://canvas.sbcc.edu/courses/46681/users/24247)

3:54am

Originally Posted 2/3/22

Stars can move "through" space, while at the same time the fabric of space is being stretched or "inflated".

Reply

(https:/

Lexie Brent (https://canvas.sbcc.edu/courses/46681/users/122267)

Jan 30, 2022

I find it interesting how St. Augustine's ideas connected religion and science in such a way that he couldn't have known. As Hawking points out, his date for the creation of the universe is not far from the time civilization began, and this date that Augustine chose was based on the book of Genesis. Another crossroads of theology and theory is his claim that "time was a property of the universe that God created, and that time did not exist before the beginning of the universe" (pg. 6). The concept of time is truly so mind boggling to me that I can see why it was/is believed that a God must have created it. I don't think I could have ever come to the conclusion that time only exists in our universe and there's no concept of time before it or outside it, without or without a Creator involved.

QUESTION: Did people (scientists, astronomers, writers, observers, etc.) think about the possibility of stars having finite lifespans before the discussion of an infinite universe?

Reply

(https:/

Naomi Xu (https://canvas.sbcc.edu/courses/46681/users/27955)

Jan 30, 2022

DISCUSSION

What never ceases to amaze me, when it comes to any discoveries, is the curiosity and stubbornness that fuels that process. From flat Earth, to geocentric then heliocentric, we prove ourselves wrong time after time. I don't think people have changed much from the those in our history.

QUESTION

I really didn't have a question about the assigned material, but after going through everyone's posts, were we supposed to start reading a brief history of time yet? I hadn't seen it on the modules or calendar?

Reply

(http

Sarah Savage (https://canvas.sbcc.edu/courses/46681/users/375381)

Feb 4, 2022

Yes, we should be reading A Brief History of Time. The reading assignments are listed in the modules that also list the lecture videos.

Reply

(http

Erin O'Connor (https://canvas.sbcc.edu/courses/46681/users/24247)

4:03am

Originally Posted 2/3/22

Good posts. We can calculate the difference in time for someone on Mt Everest vs sea level. Turns out (and we can do the calculation on this together someday) that if two twins live to be exactly 100 yrs old, the one on top of Mt Everest will have their time slowed down by 1/1000 th of a second.

Reply

(https:/

Lucca Gambone (https://canvas.sbcc.edu/courses/46681/users/405319)

Jan 31, 2022

1. While reading the first chapter of the book I found something very interesting when Hawking was talking about Ptolemy's cosmological model based of Aristotle's theory that the Earth was the center of the universe with everything revolving in circular orbits. I found this interesting because the model shown in the book looked very intriguing to me, It amazes me that back

then these people where able to figure out stuff like that with no help like the internet or technology at their fingertips. it goes to show the power of the mind.

2. My question relates to what I said in the above paragraph, and that is how did someone like Aristotle come up with the idea that the earth is at the center of the universe. My only guess could be he just guessed that's where the earth sat and tried to convince his followers the same theory. Also how did they know about mercury, Venus, Mars , Jupiter and Saturn without having modern technology.

Reply

(http

Colby Downard (https://canvas.sbcc.edu/courses/46681/users/268882)

Feb 3, 2022

Hi Lucca, during Greek times there was much less light pollution, so seeing stars at night is far easier than it is today. Planets can also be seen during the night if you know what differences you are looking for compared to the stars. According to the Library of congress, it states Aristotle's reasoning for Earth being the center of the universe was based off the four elements at the time; earth, air, fire, and water. He explains "Earth was the heaviest, water less so, and air and fire the lightest". It also explains "the lighter substances moved away from the center of the universe and the heaver elements settled into the center."

Link (https://www.loc.gov/collections/finding-our-place-in-the-cosmos-with-carl-sagan/articles-and-essays/modeling-the-cosmos/ancient-greek-astronomy-and-cosmology#:~:text=The%20Elements%20in%20Aristotle's%20Cosmic%20Model&text=Earth%20was%20the%20heaviest%2C%20water,elements%20settled%20into%20the%20center.)

Reply

(http

Erin O'Connor (https://canvas.sbcc.edu/courses/46681/users/24247)

3:53am

Originally Posted 2/3/22

Yes, they knew of the five visible eye planets (all the ones you listed) plus the sun and moon = 7 days, and the days of the week are named after all of these. Sunday, Moonday, Saturnday, etc.

Reply

Colby Downard (https://canvas.sbcc.edu/courses/46681/users/268882)

Feb 3, 2022

The knowledge the Greeks obtained about the cosmos is extremely impressive considering the extreme lack of technology they had compared to present day. They could find several arguments about why the Earth is round including the perception of ships on the horizon and the shadow of the moon. I also find it impressive that they hypothesized a system where an object is at the center and it has other large bodies of mass orbiting itself. In their case they believed it was the Earth at the center and it is actually the sun but I still find it impressive that they came to a conclusion that is somewhat close to what the solar system is.

QUESTION:

Seeing that humanity has been able to prove the Earth is round dating back to the Greeks, why are there still so many people who believe the Earth is flat despite it being proven knowledge?

Reply

Joseph Avalos (https://canvas.sbcc.edu/courses/46681/users/266013)

Feb 18, 2022

ANSWER: I believe that the answer to this is more a matter of psychological factors/ a distrust in our government then anything else considering the enormous amount of evidence supporting a sphere earth. For example, the 2 greatest psychological phenomena affecting these people are belief perseverance and confirmation bias. They are repeatedly told contradicting factual information which strengthens their belief, and with that strengthened belief they go out to search for information that will solely confirm that belief (confirmation bias), a vicious cycle.

Reply

Erin O'Connor (https://canvas.sbcc.edu/courses/46681/users/24247)

3:52am

Originally Posted 2/3/22

The Greeks had to rely more on thought and mathematics. And I hope not too many people really think the Earth is flat. That would make international travel a lot scarier.

Reply

Joseph Avalos (https://canvas.sbcc.edu/courses/46681/users/266013)

Feb 18, 2022

Towards the ending of chapter 1 of hawking discussed the “fundamental paradox in the search for such a complete unified theory”. The paradox lies in the fact that the completely unified theory itself would determine the outcome of our search for it, so why would we assume that we have come to the right conclusion? Previously, I was indifferent to whether or not the universe was arbitrary or if it was governed by definite laws, but that was because I had never thought of their being a possibility of a theory to explain everything in the universe. However, with the scientific advancements we’ve made in the past few centuries it’s entirely impossible that we may one day come to that theory or even to the relation that the universe is truly arbitrary.

QUESTION: On Page 8, Hawking states that the 2 large theories of quantum mechanics and the general theory of relativity have been known to have inconsistency between the 2 of them. What are some of the inconsistencies that can be seen between these 2 major theories?

Reply

Erin O'Connor (https://canvas.sbcc.edu/courses/46681/users/24247)

4:00am

Originally Posted 2/3/22 by Malcom Tircuit

DISCUSS:
The lecture and reading really gave me insights into the models of the universe. One thing I found very interesting in the lecture was the fact that models of the universe changed so much over the past centuries. The fact that Galileo was shunned for his discoveries just amazed me. The reading made me contemplate how we see ourselves in the universe because of the realization that we really don't know much about whats going on.

QUESTION:
During the lecture, it occurred to me that if the constant changing of universal models were a trend then maybe sometime in the future our current model will be completely disproved. I don't imagine anyone to be able to answer this question but I was wondering if maybe our current perception of our universe has any major flaws that allow it the be completely rewritten and thus disproven like all the ones that came before?

Reply