Quark Soup by David Appell

WEDNESDAY, APRIL 08, 2015

Discussion of How Global Warming Works

This is a post whose comments will be a discussion of things I'm discussing with someone on Twitter (to take it off Twitter and its character limitations).

Posted by David Appell at 4/08/2015 09:04:00 PM

208 comments:

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David Appell said...

On Twitter I wrote:
"CO2 reduces radiative heat loss = warmer surface."

to which @eachus replied:
"that's not the central issue. This is RADIATIVE heat. CO2 can't "reach out" and affect radiative output of surface."

Of course it can. CO2 radiates IR, some of it downward. That IR warms the surface, which increases its own radiation through the Stefan-Boltzmann equation.

9:07 PM

David Appell said...

@davidappell wrote:
"Simplified: Earth emits IR. GHGs absorb upgoing IR, then reemit IR in random direction, some of it downward = warming."

@eachus wrote:
"That's the same simplistic model I (and many others) have thoroughly refuted."

Refuted?? Where?

9:09 PM

David Appell said...

@eachus wrote:
"I asked a simple question: the premise behind AGW is that a band of slightly warmer air in the mid-troposphere.... (2/2) I asked how that band of warmer air warms an even warmer Earth surface. Simple question. Nobody has an answer."

Through convection and radiative transfer.

9:12 PM

David Appell said...

@eachus
"The part about how cooler gas somehow radiates heat into warmer ground is simply omitted, as it is everywhere else."

You are still hung up on this "cold can't warm a warmer object." But that statement of the 2nd law doesn't hold here, because the Earth is not a closed, adiabatic system.

GHG gas molecules emit IR. Some of it is downward. That IR carries energy. The surface is warmed when energy strikes it.

If the GHGs weren't there, the Earth's IR would continue up through the top of the atmosphere and out.

So the GHGs decrease the net upward amount of IR.

This is very easy to see in a satellite observation:

http://www.giss.nasa.gov/research/briefs/schmidt_05/curve_s.gif

9:17 PM

David Appell said...

@eachus wrote:
"Also, please see my later comments re: Pierrehumbert's book. I know I said I was done, but that was before I read chap. 4."

There are too many Tweets for me to know what you're talking about. You'll have to repeat it here. Thanks.

Rule #1: You can never ask too many questions.

ABOUT ME

David Appell

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Facebook

View my complete profile

GOOD LINKS:

- Annie Jia (The Science Journalism Experiments)
- Climate Data Sources
- Dark Roasted Blend
- Early Papers on CO2 & Climate
- Hotwhopper

PS: You read all of Pierrehumbert's Chapter 4 in a few hours?

9:21 PM

William Connolley said...

> "CO2 reduces radiative heat loss = warmer surface."

I have some sympathy with people objecting to that. Their reply is, instantaneously, correct. Indeed, if you increase CO2, the instantaneous effect is to cool the atmosphere, because it can radiate more.

Its only once all the energy flows through the system are taken into account that you end up with warming.

However, the second one is exactly correct. But the key to discussing such things is to refer to the energy balance equations, else you get lost in a maze of words. You could point them at http://scienceblogs.com/stoat/2014/02/16/the-idealised-greenhouse-effect-model-and-its-enemies/, or similar.

12:40 AM

Dumb Scientist said...

When Lonny Eachus claimed that he "refuted" David's simplistic model, he might be referring to our "conversation". Lonny first recommended John O'Sullivan's Sky Dragon Slayer book, and later promoted Dr. Pierre Latour's Slayer fan fiction. Latour is a vice chairman of O'Sullivan's "PSI" Slayer group. Latour's fan fiction is a response to Dr. Roy Spencer's thought experiment which illustrates the radiative physics of the greenhouse effect in a simplified context.

Briefly, an electrically heated plate is in a vacuum chamber with cooler chamber walls. The very first step is determining the required electrical heating power.

To solve this problem, start by applying conservation of energy. Draw a boundary around the heat source:

power in = electrical heating power + radiative power in from the chamber walls
power out = radiative power out from the heat source

Since power in = power out through any boundary where nothing inside is changing (conservation of energy):

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

After hundreds of pages, Lonny and I weren't able to agree on this very first simple step. Lonny Eachus just kept screaming the word "NET" (while implicitly disputing its standard physics definition) and adamantly insisting that electrical heating power doesn't depend on the cooler chamber wall temperature.

I kept trying to explain that the Stefan-Boltzmann law doesn't determine temperatures the way Lonny claims. It just determines "radiative power out" which is different than the electrical heating power necessary to keep the heated plate at a certain temperature within cooler chamber walls. I tried to explain that we agree that "radiative power out" from the heated plate doesn't depend on the cooler chamber wall temperature, but that "electrical heating power" is different because it **has to be zero** if the chamber walls are at the same temperature as the heated plate.

I kept trying to explain that temperature isn't determined by the Stefan-Boltzmann law. Temperature is determined by internal energy, which is determined by conservation of energy. That's why the very first step is applying conservation of energy: draw a boundary around the heat source and sum all the power passing in or out through that boundary.

Ironically, Lonny Eachus got the very first equation wrong because he adamantly refused to apply conservation of energy without wrongly "cancelling" terms, and simultaneously accused me of violating the first law of thermodynamics.

If Lonny Eachus **actually** wants to understand the greenhouse effect, he should first try to correctly derive the very first equation in Spencer's very simple thought experiment.

1:31 AM

John said...

Thermodynamical things to remember:

1) The warm body is the sun.
The cold body is interstellar space.
All the rest is simply the mechanism (a bit convoluted to be sure) in the NET process by which "heat, always and only, flows from warm to cold," eventually, in this case, with earth as intermediary.

2) A single molecule does not have a temperature. Temperature is a property of a collection of molecules.

3) A molecule about to radiate energy does NOT first send out "thermometrons," particles or rays, in all directions, to insure that subsequent energetic radiation is always sent in the direction of matter at a temperature cooler than that of the mass of matter in which said molecule resides. (Yes, some water molecules in a pot of boiling water ARE traveling in the direction of the flame ... gassssp!!!)

Deniers should be convinced that anyone demonstrating the "thermometron" will surely be awarded the Nobel Prize, receive general scientific acclaim and will publicly, and greatly, bolster their denialist ideology.

An avalanche of grant proposals to embark on the great thermometron search should be sent to the Koch (roach) brothers and other billionaire propagandists/obfuscators.

John Puma

5:01 AM

Dumb Scientist said...

In this particular case, it's probably best to avoid using the term "net". It seems to cause confusion, which is why I solved the first step in Spencer's thought experiment without using it.

- John Fleck
- Justin Berk
- RealClimate
- Skeptical Science
- Stoat
- The Green Grok
- Three Rivers Review
- Variable Variability

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Instead, if it's absolutely necessary, consider saying that more heat flows from hot to cold than vice versa. That might help eliminate the confusion that's bogged me down for hundreds of pages...

5:11 AM

Pehr Björnbom said...

Here are some basic concepts in this context.

With standard lapse rates, such as for the US standard atmosphere, increased CO2 reduces heat loss according to radiative transfer codes such as Modtran

The explanation for this is that with increased CO2 the outgoing long wave radiation (OLR) from the atmosphere to space is emitted higher up where the temperature is lower. The lower temperature decreases the outgoing radiation more than the increased CO2 mixing ratio.

If the lapse rate would be zero increased CO2 would not have any effect on the OLR, if the lapse rate would be negative, that is increasing temperature with height, increased CO2 would increase OLR.

6:55 AM

Olaf said...

Test: ε

I have created an account which allows me to comment.

I shall reply later, when I have time. For reasons I shall make clear, I will reply only once. Though you should expect it to be a long reply.

1:03 PM

Olaf said...

In case it needs to be made clear, this is Lonny Eachus.

1:04 PM

Dumb Scientist said...

Lonny, make sure your long reply makes sense for blackbodies with emissivity $\varepsilon = 1$. In that case there are no reflections. So when you list the power going in and out of a boundary around the heat source, you can't justify "cancelling" a term because of reflections that can't happen with blackbodies.

But you really don't need a long reply to apply conservation of energy to the very first step of the thought experiment you've been lecturing physicists about. A long reply with a "maze of words" would only be necessary if you wanted to distract others (or yourself) away from the fact that your position violates conservation of energy. This is a depressingly common tactic. Science of Doom finally banned a Sky Dragon Slayer after he refused to write down simple equations but kept writing long replies in an apparent attempt to distract everyone from noticing that he couldn't write down those equations.

1:36 PM

David Appell said...

Lonny Eachus @eachus wrote:
"He has a history of taking my comments out of context and grossly misrepresenting them. I shall not participate if he does."

You have one excuse after another, don't you?

You are, of course, free to ignore Dumb Scientist. I've read through this post and its comments; I don't see any dishonesty. What did you mean?

http://dumbscientist.com/archives/abrupt-climate-change#comment-45306

2:03 PM

Olaf said...

What "excuses" are those, David?

I created an account so I can comment. So that wasn't an "excuse". As far as Dumb Scientist goes, as I stated earlier I shall make all clear.

If you don't care to read what I have to say WHEN I HAVE THE TIME TO REPLY, fine. But some people work for a living, and if all you are going to do is insult me before you have read what I have to say, then I may as well not bother.

Your behavior so far does not exactly motivate me to participate in what so far looks like it was set up as an insult-fest.

Your call. If you want to hear what I have to say, then kindly wait until I have had time to say it. If not, then just continue as you have, and talk only to yourself.

5:27 PM

Olaf said...

And Bryan: our discussion was not about black bodies, as you well know. In fact it conformed to conditions you set up yourself, which did not include them.

Also, your comments about cancelling a constant are irrelevant, because when you did not accept that argument I simply dropped that example, which was intended to demonstrate something, and instead just adopted the textbook equations. You are arguing about something I have not even been arguing myself.

AS I HAVE STATED SEVERAL TIMES NOW, I shall reply fully when I have had ample time to do so. I am not going to respond to further badgering. I have other things to do.

5:33 PM

Olaf said...

And... I have not yet had time to respond fully, I am working on it. But I did have time to read back about David's comment. David, that comment was made 3 years ago. Our actual "argument" about the matter was made much later. AND, Bryan has... I will understate here... very much cherry-picked the parts of it that he wants others to know about.

I objected to Bryan's habit of "out of context plus misrepresentation" in public and on his own website about 5 years ago, yet he has continued the practice ever since. If he is going to reference things he thinks I did incorrectly that far back, then I claim the right to do the same.

Quite frankly, he argues like the old joke about the stereotype wife: "You did this way back then! You are guilty now!"

It isn't considered acceptable today, nor am I married to him.

11:52 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-09: "And Bryan: our discussion was not about black bodies, as you well know. In fact it conformed to conditions you set up yourself, which did not include them."

Once again, a black body is a limiting case of gray bodies with emissivity $\varepsilon = 1$, so there are no reflections. Any gray body equation needs to reduce to the correct black body equation when you plug in $\varepsilon = 1$. So make sure that when you apply conservation of energy as your textbook explains, that you don't accidentally "cancel" a term because of reflections that can't happen with blackbodies.

Jane/Lonny Eachus, 2015-03-20: "... What you did -- typically in your fashion, in my experience -- was change your story when you realized that it was not a viable avenue of attack. ..."

Oh, the irony:

Lonny Eachus, 2015-04-09: "Also, your comments about cancelling a constant are irrelevant, because when you did not accept that argument I simply dropped that example, which was intended to demonstrate something, and instead just adopted the textbook equations. You are arguing about something I have not even been arguing myself."

Once again, you misinterpreted the textbook equations. Temperature isn't determined by the Stefan-Boltzmann law. Temperature is determined by internal energy, which is determined by conservation of energy.

Don't you see how ironic it is that you're accusing multiple physicists of violating the first law of thermodynamics, while adamantly refusing to apply conservation of energy to the very first step of the thought experiment you've been lecturing us about?

If you read your textbook carefully, you'd discover that this is the textbook physics method of applying conservation of energy:

An electrically heated plate is in a vacuum chamber with cooler chamber walls. Draw a boundary around that heat source:

power in = electrical heating power + radiative power in from the chamber walls
power out = radiative power out from the heat source

Since power in = power out through any boundary where nothing inside is changing:

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

That wasn't so hard, was it? Notice that I never had to use the word "net" here, so Lonny Eachus should also be able to apply conservation of energy without using that confusing word.

Lonny Eachus, 2015-04-09: "David, that comment was made 3 years ago. Our actual "argument" about the matter was made much later. ... Quite frankly, he argues like the old joke about the stereotype wife: 'You did this way back then! You are guilty now!'"

No, my point is that you haven't changed. You're still repeating Latour's Sky Dragon Slayer nonsense. If you want to prove otherwise, just apply conservation of energy to the very first step in Spencer's thought experiment without using the confusing word "net". It's really not that difficult.

3:31 AM

David Appell said...

Lonny Eachus wrote:
"http://dumbscientist.com/archives/abrupt-climate-change#comment-45306"

You'll have to be more specific -- I don't see any dishonesty.

BTW, I muted you on Twitter, so I can only see your replies here.

8:18 AM

David Appell said...

Lonny, why don't you just ignore DS if you don't like him, and address the points that were brought up on our recent

Twitter back-and-forth?

8:22 AM

Dumb Scientist said...

Lonny Eachus, 2015-04-08: "NET radiative heat transfer always goes from hot to colder. Never the other way without assistance of some kind."

Robin Levett, 2015-04-08: "Not quite true for limit cases, but close enough for these purposes. Who says otherwise?"

Lonny Eachus, 2015-04-10: "As for who appears to be saying otherwise, his name is Bryan Killett, aka Dumb Scientist. Not that he disagrees with the statement, but he appears to have some custom definition for "net" that allows thermodynamically hotter gray bodies to absorb radiative energy from colder gray bodies, so further heating."

No, Lonny. In every single equation I've derived, more heat flows from hot to cold than vice versa. Once again:

Jane/Lonny Eachus, 2014-12-14: "If power in = power out (your own stipulation), and the only NET power INTO a defined spherical region is electrical, and the only NET power OUT of that region is radiative, then net radiative power out **at steady-state** must therefore be equal to the net electrical power consumed."

Lonny seems to be saying that at steady-state:

net electrical power consumed = net radiative power out

But net radiative power out of a boundary around the source = "radiative power out" minus "radiative power in", so the equation Lonny described also says:

net electrical power consumed = "radiative power out" minus "radiative power in"

Notice that this is equivalent to the equation I derived above using conservation of energy.

Lonny Eachus, 2015-04-10: "Per him, in general, a hotter gray body will accept radiative heat transfer from a colder body to become hotter yet. Not only does he assert this, he has hounded and harassed me over it for a long time, won't let it rest."

Actually, **that's also what Lonny's own equation asserts**, as long as Lonny Eachus uses the standard physics definition of the term "net".

I'll "let it rest" as soon as you stop baselessly accusing scientists of incompetence and dishonesty, and stop spreading misinformation which threatens the future of our civilization. Until then, I'll keep debunking you, and you'll probably just keep accusing me of harassment without noticing that I'm just trying to get you to stop harassing mainstream scientists.

11:25 AM

Dumb Scientist said...

Lonny Eachus, 2015-04-10: "In brief, he seems to feel the presence of a colder body somehow alters the Stefan-Boltzmann radiative power output of the hotter body. He further asserts this is a result of Kirchhoff's Law, which frankly, would appear to be a direct contradiction or failure to understand it. At equilibrium (which the relevant circumstances are not), Kirchhoff's Law states that absorption effectively results in a shift of output spectra to keep the total radiative output power constant. What the source of his apparent failure to understand these concepts is, I have no idea. The result of this is no NET absorption of energy from the other body, no increased thermodynamic Temp."

Nonsense. Once again, I seem to feel that temperature is determined by internal energy, not the Stefan-Boltzmann law. I seem to feel that internal energy is determined by conservation of energy. I further assert that if you ever apply conservation of energy to the very first step of Spencer's thought experiment, you might finally learn that the "apparent failure to understand these concepts" isn't mine.

Lonny Eachus, 2015-04-10: "This has been the essence of my argument to him: radiative power output unchanged, therefore T via the Stefan-Boltzmann relation, must also remain unchanged. it is a simple logic chain."

Simple and completely wrong, because radiative power output isn't held unchanged in Spencer's thought experiment. Once again, **electrical heating power** is held unchanged.

I've repeatedly explained this important difference to Lonny, but he simply calls it a red herring and continues to confuse these two basic concepts.

Once again, "radiative power out" is different than the electrical heating power necessary to keep the heated plate at a certain temperature within cooler chamber walls. "Radiative power out" from the heated plate doesn't depend on the cooler chamber wall temperature, but "electrical heating power" is **has to be zero** if the chamber walls are at the same temperature as the heated plate.

Jane/Lonny Eachus, 2015-03-17: "... In order for YOUR argument to work, a sphere of one substance suspended in a vacuum cavity surrounded by the same substance at the same temperature, would spontaneously increase in temperature. ..."

Lonny Eachus, 2015-04-10: "My argument also follows directly from the very same cavity experiments which led to Kirchhoff's Law. Per Killett's version of transfer, a sphere in a cavity would spontaneously heat relative to the walls. He has failed to explain why that would NOT happen, if his version of the physics were true. That result would not only be counter to observation, it would violate 1st & 2nd laws of thermodynamics... which even Wikipedia clearly explains on its page about Kirchhoff's. No radiative physics book needed."

Nonsense, Lonny. The last time you made this absurd claim, I explained why that would NOT happen: Here's the first energy conservation equation I derived:

electricity + sigma*T_c^4 = sigma*T_h^4

Notice that if the two temperatures T_c and T_h are equal, the required electrical heating power per square meter (electricity) = 0. So my equation actually says that a sphere in a vacuum cavity would stay at that temperature forever without any electrical heating power.

It bewildering that Lonny keeps making this absurd claim, despite the fact that my energy conservation equation shows that his claim is trivially wrong. It's even more bewildering that Lonny makes this claim but can't derive an energy conservation equation showing that the sphere doesn't need electrical heating power if it's surrounded by walls at the same temperature.

Lonny, if you ever apply conservation of energy to the very first step of Spencer's thought experiment rather than frantically tweeting a maze of words, you might finally begin to understand how the greenhouse effect works.

11:29 AM

Olaf said...

Bryan:

You have just demonstrated exactly the reason I will not argue with you.

Your own comments, which are a matter of public record, have been that the colder gray-body "passive plate" in our discussion causes the heat source to get hotter than it would in the absence of said plate.

You are now arguing that the plate is irrelevant to your argument, and that the heat source would be hotter without its presence?

The subject was gray bodies. There is no reflection. You have repeatedly stated that Kirchhoff's law plays a role. You don't get to have that both ways.

Example: "Simple and completely wrong, because radiative power output isn't held unchanged in Spencer's thought experiment. Once again, electrical heating power is held unchanged."

"Electricity" is irrelevant. As I have pointed out to you before, the heated sphere could be heated by burned methane from horse farts, it matters not. The only relevant thing is that the power input remains unchanged.

So: given that, explain how the radiative power output of the sphere (and therefore temperature... they are strictly related) increases, if there is no change in NET INPUT?

Again you argue against yourself. Conservation of energy says the steady-state power output does not change unless the steady-state input also changes. There is nothing tricky, strange, or false in that statement.

So... where is that additional input coming from? It isn't your "electrical" heating source, because that is required to be held constant.

So your other source of power is... what?

Your answer in the past was explicitly, and still logically must be, the cooler passive plate, since THERE IS NO OTHER POSSIBLE SOURCE PRESENT.

Q.E.D.

I am done. I have nothing further to say to anyone here, thanks to Bryan.

12:43 PM

David Appell said...

Lonny Eachus, you've made one excuse after another to get out confronting the science. Good riddance.

12:45 PM

Dumb Scientist said...

Lonny, you're just creating a maze of words rather than simply applying conservation of energy. I'll charitably assume you don't realize this, so you're actually just inadvertently distracting yourself.

So once again, focus.

An electrically heated plate is in a vacuum chamber with cooler chamber walls. Draw a boundary around that heat source:

power in = electrical heating power + radiative power in from the chamber walls
power out = radiative power out from the heat source

Since power in = power out through any boundary where nothing inside is changing:

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

That wasn't so hard, was it? Notice that I never had to use the word "net" here, so Lonny Eachus should also be able to apply conservation of energy without using that confusing word.

Now you try, Lonny. What power do you think flows in and out of a boundary around the heated source? If you get this answer correct, many of your other questions will answer themselves.

12:52 PM

Olaf said...

I am not QUITE done, David, since you aren't following the logic here. It isn't good science.

Per the Stefan-Boltzmann law, increased temperature is strictly linked to increased radiant power output (gray-body).

The input power is FIXED. Constant. And the apparatus is specified to be at steady-state.

Therefore, simple conservation of energy: a sphere at one temperature (via S-B law) outputs a given, STEADY radiant power. As sphere at a higher temperature, again steady-state, puts out a STEADY, increase radiant output power.

So to be clear: this is not a matter of an object "absorbing heat" and maintaining it without additional input. It is specified to be a steady-state, so an increased temperature means a STEADY output of more radiant power.

However, the INPUT to the system is fixed, as per the specification.

Ask Bryan where this extra STEADY stream of power is coming from. Input is fixed, so the ADDITIONAL output power that is required to maintain a steady hotter temperature is NOT supplied by that constant input.

So where is it coming from? Just answer that.

Killett says the radiant output power is not fixed, only the input power is. So much is true, but he neglects to point out that a higher STEADY radiant output requires a higher STEADY input... which our only input cannot supply, because it is fixed.

Where is the extra STEADY power coming from?

In the past, Killett said it was supplied by radiation from the (cooler) passive plate, being absorbed by the (hotter) heated sphere. This is a matter of public record.

That doesn't happen.

I don't know what argument he is making now, nor do I care. It is fundamentally obvious that he is trying to make power flow "uphill", as it were, to a more energetic state by "absorbing" power from the colder walls... which also doesn't happen, OR he is creating a steady flow of power (therefore energy) from nothing... which also doesn't happen.

You can call that "good science" all you like, David, but even a schoolchild can see that the numbers don't add up.

Bye now.

1:05 PM

Dumb Scientist said...

Lonny, I'll answer one of your questions. But quid pro quo first.

What power do you think flows in and out of a boundary around the heated source? Just two lines.

Then I'll answer one of your questions. But first, two lines please?

Lonny's power in =

Lonny's power out =

1:08 PM

Olaf said...

I have said all I have to say, but I'll repeat.

If you want to solve this problem, you have to specify where the extra STEADY stream of input power, which is required to maintain a hotter temperature, comes from.

$\varepsilon\sigma T^4$

Increase the steady-state T, you increase the STEADY output power, which requires additional STEADY input.

Power input to the system is fixed, whether it is electrical or any other source. It doesn't matter.

This isn't complicated. It isn't anything more than simple conservation of energy plus high-school-level basic thermodynamics.

In order for the extra STEADY input power required to maintain the hotter temperature to come from the chamber walls, you would require power (therefore energy) to spontaneously flow from a thermodynamically less energetic state to a more energetic state. That is a violation of very elementary physics.

If absorption from the chamber walls is not your claimed "solution" (it used to be, again I have you on record), then explain where the extra steady stream of input power is coming from.

I don't need to indulge in your own fanciful argument to demand that you explain this very basic point. It isn't "rocket science", as they say. For a hotter central sphere, you require additional steady input power from somewhere. What is the source?

1:33 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-10: "... he is creating a steady flow of power (therefore energy) from nothing... which also doesn't happen. ..."

Just to be clear, the law that energy isn't created from nothing is called "conservation of energy" and is also called the first law of thermodynamics.

Lonny Eachus, 2015-04-10: "... I don't need to indulge in your own fanciful argument to demand that you explain this very basic point. It isn't "rocket science", as they say. For a hotter central sphere, you require additional steady input power from somewhere. What is the source? ..."

The source can only be found by applying conservation of energy.

I've already showed you three textbooks which explain that conservation of energy means that power in = power out through any boundary where nothing inside is changing.

This isn't a fanciful argument. It's the only way to answer your question, and the only way to see if someone's actually creating energy from nothing.

What power do you think flows in and out of a boundary around the heated source? Just two lines.

Lonny's power in =

Lonny's power out =

1:48 PM

Olaf said...

You have answered nothing.

I repeat, once again:

$\varepsilon\sigma T^4$

The experiment begins with input power used solely for input to the heated central element, sufficient to maintain the steady radiant output power from a gray body, at T.

The dimensions do not change.

Your claim is that adding a passive, cooler gray body nearby causes T to increase when steady-state is again achieved.

The increased T (per Stefan-Boltzmann, above) means increased radiant output power.

This is not a matter of the central body merely absorbing heat like a sponge and holding it. Increased T means increased radiant output power.

Input to the system is only sufficient to maintain temperature at T.

You claim the body heats to T + X.

Repeat: where is the additional input power sufficient to maintain the radiant output power associated with $(T + X)^4$???

Where does it come from? I am done asking. If you have no answer, I will accept that you have no answer. But you are evading the question.

1:58 PM

Dumb Scientist said...

How could anyone possibly figure out where "additional input power" is coming from, or if it's even necessary, **without** using conservation of energy?

Conservation of energy is one of the most fundamental principles in physics, except maybe Noether's theorems. If you keep refusing to use conservation of energy, you'll never be able to answer even the simplest physics questions.

2:04 PM

Olaf said...

Who said anything about not requiring conservation of energy?

Not I. In fact I do require conservation of energy. But conservation of energy does not require complex discussions of boundaries to exist.

Fairly elementary physics have defined the problem:

$\varepsilon\sigma T^4$

(I am ignoring area here, which I can validly do because the dimensions do not change. Further, we agreed in the beginning that emissivity does not change with temperature in our little model.)

Input power is sufficient to maintain steady-state radiant output power at T. This is not difficult to understand.

A passive gray body is added nearby, and the system is allowed to come to steady-state again. (This is not equilibrium, but steady-state.)

You claim this causes the temperature to increase to T + X.

Steady-state radiant output power given by $\varepsilon\sigma(T+X)^4$ is greater than the steady-state output power at $\varepsilon\sigma T^4$.

This requires additional input power to the heated body, in order to maintain this higher output power. THIS is very simple conservation of energy.

The question is very simple: what do you claim is the source of that additional input power to the central heated body?

Is it the cold walls? Is it the passive plate? Does it magically appear from thin air? What?

It is a simple question, and no matter how simple or your complex your own conservation of energy argument is, this question must still be answered by it.

So what is the answer? If you tell me, THEN maybe we can discuss HOW it gets there.

2:20 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-10: "Who said anything about not requiring conservation of energy? Not I. In fact I do require conservation of energy. But conservation of energy does not require complex discussions of boundaries to exist."

Yes it does. In this context, the definition of conservation of energy requires drawing a boundary, then summing all the power going in or out of that boundary. Again, see those textbooks. If nothing inside that boundary is changing, power in = power out.

That's conservation of energy, Lonny.

Lonny Eachus, 2015-04-10: "The question is very simple: what do you claim is the source of that additional input power to the central heated body?"

The answer is very simple. You need to apply conservation of energy. That requires drawing a boundary, then summing all the power going in or out of that boundary.

What power do you think flows in and out of a boundary around the heated source? Just two lines.

Lonny's power in =

Lonny's power out =

2:30 PM

Olaf said...

How about this: let's use your "boundary" argument. This will require area A to express the actual total power.

So let's draw your boundary at the surface of the central heated sphere.

Input at the start (INCLUDING incident radiation, if you insist, though I do not agree that is valid) is sufficient to maintain

$A\varepsilon\sigma T^4$

Since this is at the surface of the heated body, this is total power OUT through your boundary.

After you add a passive plate, and the system reaches steady-state again, you claim

$A\varepsilon\sigma(T+X)^4$

for some value of X. Again, this is total power OUT through your boundary.

Since your "electrical" (or whatever) input is fixed, increased total power OUT is going to require increased power IN.

Yes?

So what do you claim is the additional power IN? Could it be -- gasp -- incident radiation?

See? That was not a difficult question, was it? The strange part is that you don't see that it's effectively identical to the question I already asked.

2:38 PM

Dumb Scientist said...

Lonny, once again you're just creating a maze of words rather than simply applying conservation of energy. Again, I'll charitably assume you don't realize this, so you're actually just inadvertently distracting yourself.

So once again, focus.

An electrically heated plate is in a vacuum chamber with cooler chamber walls. Draw a boundary around that heat source. What power do you think flows in and out of that boundary? Just two lines. Don't worry about adding passive plates yet, or anything like that. All that comes later.

Lonny's power in =

Lonny's power out =

Just. two. lines.

2:44 PM

Olaf said...

I already stated it in the previous comment, Bryan. What more do you require?

What is it you think I missed?

2:55 PM

Dumb Scientist said...

Really? Then could you please just copy those two lines in this format:

Lonny's power in =

Lonny's power out =

2:58 PM

Olaf said...

I'm not prepared to discuss quantities yet. As I said, let's get the principle down first.

WHAT is coming in through the boundary, other than (A) electrical power, and (B) incident radiation (and the power associated with it)?

WHAT is going out through your boundary, other than radiative power out?

Let's get the principle down. If I have missed something here, let's have it.

We've already had this discussion, more than once, you know.

2:58 PM

Dumb Scientist said...

This comment has been removed by the author.

3:02 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-10: "I'm not prepared to discuss quantities yet. As I said, let's get the principle down first. WHAT is coming in through the boundary, other than (A) electrical power, and (B) incident radiation (and the power associated with it)? WHAT is going out through your boundary, other than radiative power out?"

I'm not prepared to discuss quantities yet either. What you just wrote seems to suggest that you're saying:

Lonny's power in = electrical heating power + radiative power in from the chamber walls

Lonny's power out = radiative power out from the heat source

Is that true, Lonny?

3:04 PM

Olaf said...

Stop with the "Lonny's this" and "Lonny's that", and get on with it, for Christ's sake. Nobody reading your comments is an idiot.

3:07 PM

Dumb Scientist said...

I'm trying to get on with it by asking if we can agree on this:

power in = electrical heating power + radiative power in from the chamber walls

power out = radiative power out from the heat source

3:09 PM

Olaf said...

And I said if I have missed anything, by all means supply our ignorance.

You are being tiresome and pedantic. Get on with it.

3:10 PM

Dumb Scientist said...

Again, I can't get on with it until you let us know if we can agree on this:

power in = electrical heating power + radiative power in from the chamber walls

power out = radiative power out from the heat source

3:12 PM

Olaf said...

It isn't a matter of "agreement". It is either right or wrong.

If it's right, let's move on.

If you think it's wrong, then explain how.

GET ON WITH IT!

That is not a question. I am simply going to leave if you continue in this pedantic manner.

3:15 PM

Dumb Scientist said...

I also really want to move on. That's why I'm asking if you think this is right:

power in = electrical heating power + radiative power in from the chamber walls

power out = radiative power out from the heat source

I'm sorry for using the word "agree" rather than "right". Do you think those powers are right? If so, we can move on. Again, I also really want to move on.

3:20 PM

Olaf said...

We DID have to agree on initial condition, but we don't have to "agree" on anything since.

Reasonable precision and logic is required, but you are being ridiculous.

Make your case, and do it now. I'll tell you whether I agree when I read what you have to say. But you're wasting everybody's time.

Move on, or not. Your choice. No more warnings.

3:28 PM

Olaf said...

I already gave you my answer. Asking me to confirm it over again is wasting everybody's time.

Move on.

3:30 PM

Dumb Scientist said...

It seems like Lonny does actually think those powers are right. According to conservation of energy, if nothing inside the boundary is changing, power in = power out:

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

Since radiative power in depends on the chamber wall temperature, this equation says that electrical heating power at steady state depends on the chamber wall temperature. Do you think that's right?

3:35 PM

Olaf said...

So... you finally answered a simple question I asked you an hour ago.

Great.

Next question: at all times in this little experiment, the central body is hotter than the surrounding walls or any intervening "plate". This much follows from the stated conditions.

So what you are saying is: the radiative power out of the gray body is dependent on the input from the external heat source, PLUS the incident radiation from the cooler chamber walls, just as I asked an hour ago.

Did I state that correctly? Yes or no is quite sufficient. Like you, I am simply trying to make sure we understand each other.

3:41 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-10: "So what you are saying is: the radiative power out of the gray body is dependent on the input from the external heat source, PLUS the incident radiation from the cooler chamber walls, just as I asked an hour ago."

Actually, I'm saying that radiative power out depends on the temperature of the heat source, and only the temperature of the heat source. I've always agreed that the Stefan-Boltzmann equation describes radiative power out.

I'm just trying to explain that the temperature of the heat source depends on the internal energy of the heat source, and that internal energy is determined by conservation of energy. Which requires writing down that equation which you... still haven't said whether or not you think is right? Do you?

3:45 PM

Olaf said...

Just write it down. I won't know whether I agree with it or not until I see it.

But as for your comment: you are saying that the incident radiation alters the "internal energy" of the central heated body?

Yes or no?

3:50 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-10: "Just write it down. I won't know whether I agree with it or not until I see it."

I already wrote down the steady-state equation using the powers you already seemed to say were right:

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

Is that right?

Lonny Eachus, 2015-04-10: "But as for your comment: you are saying that the incident radiation alters the "internal energy" of the central heated body?"

Conservation of energy says that any energy passing through a boundary alters the "internal energy" inside that boundary.

Is that right?

3:58 PM

Olaf said...

I am not "agreeing" with you at this point. One LAST time, I am going to say: make your case and get on with it.

Your argument does not require my agreement. Let's just see what it is.

You are trying my patience. But that isn't exactly anything new either.

4:01 PM

Olaf said...

And as for your latest question: "Is that right?", I was asking YOU, if that was YOUR assertion.

Yes or no. Don't answer a yes or no question about your own argument with a question. That's not very bright.

4:05 PM

Dumb Scientist said...

A shared understanding requires building a strong foundation first. It's pointless to argue about more complicated topics if we can't even agree on the basics. That's why I've struggled so hard to see if we can finally say that this steady-state equation is right:

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

Since radiative power in depends on the chamber wall temperature, this equation says that electrical heating power at steady state depends on the chamber wall temperature. Again, do you think that's right?

4:05 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-10: "And as for your latest question: "Is that right?", I was asking YOU, if that was YOUR assertion. Yes or no. Don't answer a yes or no question about your own argument with a question. That's not very bright."

It's not just my assertion. It's basic physics.

Conservation of energy says that any energy passing through a boundary alters the "internal energy" inside that boundary.

If you think that's right, then say so. Otherwise, I'll try to help you understand basic physics.

4:07 PM

Olaf said...

So it was your assertion.

You can assert basic physics if you like. I don't mind. The question was whether that was what you were saying. You have a habit of not answering simple questions directly. It is very tiresome.

4:12 PM

Dumb Scientist said...

Building a shared understanding is tiresome, but it requires building a strong foundation first. It's pointless to argue about more complicated topics if we can't even agree on the basics. That's why I've struggled so hard to see if we can finally say that this steady-state equation is right:

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

Since radiative power in depends on the chamber wall temperature, this equation says that electrical heating power at steady state depends on the chamber wall temperature. Again, do you think that's right?

4:15 PM

Olaf said...

Not to mention the part about being excruciatingly, insultingly pedantic.

4:18 PM

Dumb Scientist said...

Then let's try to move on. Can we finally say that this steady-state equation is right?

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

Since radiative power in depends on the chamber wall temperature, this equation says that electrical heating power at steady state depends on the chamber wall temperature. Again, do you think that's right?

4:20 PM

Olaf said...

"Building a strong foundation" does NOT require evading simple yes or no questions, then repeating them yourself later. Don't flatter yourself. You are being insulting.

You seem to forget we have had this entire conversation before. So GET ON WITH IT.

4:20 PM

Dumb Scientist said...

I'm sorry. I'm not trying to be insulting, I'm trying to make sure we don't disagree about the basics. I know we had this conversation before, and that neverending train wreck is why I'm trying to be so careful about the basics. Not because I'm trying to be insulting, but because I'm obviously failing to communicate. It's my fault. I accept full responsibility.

Again, can we finally say that this steady-state equation is right?

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

Since radiative power in depends on the chamber wall temperature, this equation says that electrical heating power at steady state depends on the chamber wall temperature. Again, do you think that's right?

4:24 PM

Olaf said...

STOP asking me if I agree and just make your case. Do you even listen?

Does anyone else here see yet just ONE of the reasons I was reluctant to come here?

In fact, this is taking so exasperatingly long I have to leave for a while.

4:25 PM

Olaf said...

"Again, can we finally say that this steady-state equation is right?"

That was it. I'm out of here, at least for a while.

If you can bring yourself to make some progress while I'm gone, please do. But I don't promise to be participating in this any more over the weekend.

We COULD HAVE finished it by now.

4:27 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-10: "STOP asking me if I agree and just make your case. Do you even listen? Does anyone else here see yet just ONE of the reasons I was reluctant to come here? In fact, this is taking so exasperatingly long I have to leave for a while."

Lonny, what point would there be to arguing about something complicated if we can't even agree on the very first basic energy conservation equation?

That would be like arguing about calculus if we had a serious disagreement about arithmetic.

Lonny Eachus, 2015-04-10: "We COULD HAVE finished it by now."

Really? Then can you finally say if you think this steady-state equation is right?

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

Since radiative power in depends on the chamber wall temperature, this equation says that electrical heating power at steady state depends on the chamber wall temperature. Again, do you think that's right?

4:30 PM

Olaf said...

We aren't "agreeing". This isn't a consensus. We're having a scientific argument.

If you can't make your case here for others to see without me agreeing with you all the time, maybe you should return to school and learn how to do it all by yourself.

You can say all you want about my attitude, but we have been over ALL of this before, and to say you are being tiresome is gross understatement.

STOP ASKING FOR MY AGREEMENT AND MAKE YOUR CASE.

And you can do it while I'm gone, if you want. There is nothing stopping you. Your argument DOES NOT REQUIRE my

agreement. I repeat: this isn't gradeschool.

I won't apologize for being blunt, if you aren't going to apologize for being such a pedantic ass.

I will reply later, if I have time. I hope you will have written something meaningful in the meantime. If not, you are just wasting my time and I shall have nothing further to say. I didn't come here to be treated like a child.

4:38 PM

Dumb Scientist said...

I've already made my case, Lonny. Conservation of energy says:

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

Since radiative power in depends on the chamber wall temperature, this equation says that electrical heating power at steady state depends on the chamber wall temperature.

4:41 PM

Olaf said...

No, no. For some reason it seems to be reflecting off of your head, so I will repeat myself again but add a little detail:

I don't have time for this back-and-forth balderdash. If you have an analysis of Spencer's experiment -- or preferably, the modified version of the experiment we discussed before -- then write it up. I will wait.

When you are DONE, I will reply. I may have a few questions before I do, but those can wait until after you are DONE writing it all up.

I neither need nor desire to sit here while you pick through it at a glacier's pace piece by agonizing piece, asking for confirmation each step of the way. Either you are confident of your analysis, or you are not. I care little one way or the other, but I'm not going to sacrifice days of time because of your trepidation.

Do it, or not. Your choice. If you do, then LET ME KNOW WHEN YOU ARE DONE, and I will come back here and have a look.

5:27 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-10: "Either you are confident of your analysis, or you are not. ... LET ME KNOW WHEN YOU ARE DONE..."

I am confident of my analysis. As I've already explained, conservation of energy says:

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

Since radiative power in depends on the chamber wall temperature, this equation says that electrical heating power at steady state depends on the chamber wall temperature.

I am done.

5:30 PM

Olaf said...

You know very well what I meant.

If you have AN ANALYSIS of the modified Spencer experiment we discussed, with dimensions and emissivities and your final result, let me know.

I don't dispute conservation of energy in this context, and never have.

If you are confident in YOUR COMPLETE ANALYSIS of the entire experiment we discussed before, rather than in just a couple of simple platitudes about physics, then as I said before, write them up. I will be happy to show you where the errors are.

As I told you some time ago, whether you do or not, I plan to, eventually, using your own comments as made to me previously. So you may as well.

If you want to continue to evade, you can do that too. I'm not trying to force or manipulate or even talk you into doing anything. But at the same time, you don't have any right to expect me to sit here through this agonizingly slow, pedantic process of yours.

I can only thank providence that you were not one of my professors. I would likely have given up school forever.

5:58 PM

Olaf said...

Actually, I will go further than that.

Since you were presuming to "school" me here, then I insist that after you write it up, you present it here.

Let's face it: as evidenced by today's exchange, you expect me to sit through this painful process of yours for who knows how long, until you get to the point. At this pace, it would be probably be days or even weeks.

It is not reasonable to expect me to do that.

What IS reasonable is to ask you to write down your argument about Spencer's experiment, including your math and your results, in their entirety, so that I and everyone else can read it at our leisure.

You explained it to me before, and showed me your results before, albeit piecemeal. Why do you balk at writing it all down in one coherent piece?

I'll leave to to you to decide what to do. But unless you can bring yourself to put your argument into a reasonably coherent whole for me to read, you are wasting my, and everyone else's, time, and I will ask you to not bother me further.

Good day.

6:11 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-10: "If you are confident in YOUR COMPLETE ANALYSIS of the entire experiment we discussed before, rather than in just a couple of simple platitudes about physics, then as I said before, write them up. I will be happy to show you where the errors are."

Lonny Eachus, 2015-04-10: "What **IS** reasonable is to ask you to write down your argument about Spencer's experiment, including your math and your results, in their entirety, so that I and everyone else can read it at our leisure. You explained it to me before, and showed me your results before, albeit piecemeal. Why do you balk at writing it all down in one coherent piece?"

Lonny, after I completed my COMPLETE ANALYSIS (in four parts linked here), you finally revealed that it was a complete waste of time because you'd disagreed with the very first equation I wrote down, but strung me along anyway.

So this time, if you disagree with the very first equation I just showed you, please explain why you disagree. Otherwise it's a complete waste of my time and your time.

Lonny Eachus, 2015-04-10: "Let's face it: as evidenced by today's exchange, you expect me to sit through this painful process of yours for who knows how long, until you get to the point. At this pace, it would be probably be days or even weeks. It is not reasonable to expect me to do that."

Lonny, unless we agree on the very first equation, it might take **months** or longer. That's because it's already been months since I first showed you my COMPLETE ANALYSIS, and you **still** haven't said if you think the very first equation is right.

6:23 PM

Olaf said...

No. Once again, you are presenting a piecemeal argument, in fact pieces you have chosen yourself (because our actual discussion took place over a greater time span).

Not good enough. If you don't see fit to write up your analysis, math, and conclusions in a single, coherent argument you are wasting everyone's time. I'm not going to pick through your own cherry-pickings to point out where parts are missing.

Again: **it is not reasonable** to ask me to do so.

Present your argument, complete, all in one place, so that reasonable people can see it, think about it, and comment on it. An informal paper, if you will. I don't ask that you publish it or have it peer-reviewed. But it is completely reasonable to ask that you present it in a single coherent form that does not require OTHER PEOPLE to wonder whether they got the whole story.

You know what I am saying is right.

There is NOTHING unreasonable about that request. If you do not present it in a form that others can easily read and comment on, I will consider you to have conceded the argument. I am a reasonable person, these other people are presumably reasonable also. I am asking of you nothing strenuous or even a little bit unreasonable or even unusual.

That is my final word. Do it the right way (and you know that it is), or I will consider you to have conceded.

No more prevarication. Do it right or shut up.

7:34 PM

Olaf said...

Although I am sure you know how this works, I will spell it out so there is no misunderstanding.

You have a point to make. Well, great. It's simple. It goes like this:

In a single document -- the number of pages are up to you -- write down:

Specifications of the problem or experiment

Premises

Reasoning, logic, and math, leading from the premises up to:

Conclusion or Results.

Easy, eh?

There are several great things about this form of argument:

(A) Everybody understands how it works. Hell, it could even get published.

(B) Everybody knows what the arguments are, because they're all laid on the table. They can be examined, mulled over, discussed.

(C) There is no ambiguity. Nobody has to wonder whether your position might be a little bit this way, or a little bit that way... it is written in clear English. Or whatever language; these days it is not so difficult to translate.

See? This is the way most people make formal arguments, or educate others. You might try it. It could even be fun. No promises.

8:57 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-10: "Present your argument, complete, all in one place, so that reasonable people can see it, think about it, and comment on it."

Good grief, Lonny. I just linked to my complete analysis, and your reaction shows that it was a complete waste of my time and your time. Again, you strung me along claiming that you wanted to see the entire thing, then finally revealed that you'd disagreed with the very first equation that I'd written down.

Now, you apparently want to play the same game again. What purpose would that serve, especially given that my complete analysis is now linked above? Anyone who clicks on it can see that you just disputed the very first equation anyway.

Again, conservation of energy says:

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

Since radiative power in depends on the chamber wall temperature, this equation says that electrical heating power at steady state depends on the chamber wall temperature.

If we can't even agree on the very first equation, arguing about more complicated topics would be a complete waste of time. Maybe that's the point?

3:23 AM

David Appell said...

Lonny Eachus, if you disagree with DS's first equation, how about writing down what you think that equation should be?

And please stop threatening to leave with every comment. Has it been a dozen times now you're threatened, or two dozen?

8:35 AM

David Appell said...

PS: DS's equation looks just fine to me.

8:47 AM

Olaf said...

I will repeat here:

I do not "disagree" with Killett's statements so far.

But I am NOT going to waste my time arguing in a piecemeal, hugely time-consuming manner.

My request that he put his argument in a single document for ALL to read and review in one place was entirely reasonable, and I'm sticking by it.

I am not going to give him further opportunity to claim that he made certain arguments and deny that he made others, or even worse that I had made arguments that in fact I had not, and show others only those parts that he prefers.

I was asked to come here. I don't "demand" anyone do anything. But if my participation is desired in a scientific discussion or debate, as a requirement of my participation I expect other people to behave in a reasonable manner, and lay their arguments out in such a way that all can see.

I have good reason to ask this in particular from Bryan Killett.

12:24 PM

Olaf said...

If Bryan refuses to put his thesis in a single document in cohesive and more-or-less standard form (I am not fussy), then I refuse to participate further.

That is not an unreasonable request and it is that simple.

12:27 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-11: "If Bryan refuses to put his thesis in a single document in cohesive and more-or-less standard form (I am not fussy), then I refuse to participate further."

Many moons ago, Dr. Spencer proposed a simple thought experiment intended to help people begin to understand how the greenhouse effect works, such as (for example) how it keeps Venus hotter than Mercury.

In Spencer's thought experiment, an electrically heated plate is at 150°F in a vacuum chamber with chamber walls at 0°F. The heated plate's electrical heating power (**not** radiative power out) is held constant, and a colder passive plate is added. Spencer asks: what will happen to the temperature of the heated plate?

Note that electrical heating power is different from radiative power out, because electrical heating power has to be zero if the chamber walls are also at 150°F. Once again, this is true even if the plate is heated by Lonny's "horse farts" rather than electricity. In that case, Lonny's horse wouldn't have to fart **at all** if the chamber walls were also at 150°F, because conservation of energy makes it clear that there's no heating power required, either electricity or Lonny's horse farts, etc.

Also note that "radiative power out" depends on the heated plate's temperature through the Stefan-Boltzmann law. So if Spencer had meant to hold "radiative power out" constant instead of electrical heating power, his question would have been "if the temperature of the heated plate is held constant, what will happen to the temperature of the heated plate?"

That would seem like a really silly question with an absurdly obvious answer. It makes much more sense to hold electrical (or Lonny's horse fart) heating power constant, as Spencer actually said.

In my very first comment, I solved a complete blackbody example using a flat plate approximation for simplicity and brevity. This is equivalent to assuming that the cold passive plate is a shell completely enclosing the heat source (like the greenhouse effect completely encloses the Earth), and that the heat source and passive plate are spherically symmetric and (almost exactly) the same size, and that the very thin passive plate is a very good thermal conductor. It only took a few paragraphs and one simple energy conservation equation to show that the enclosed heat source would warm to a steady-state temperature of ~235°F.

After Lonny objected to that simple solution, I solved the problem more accurately. I've already linked that solution, but it's copied below just in case Lonny's serious about not disputing the very first equation **once again**.

The more accurate final answer for the enclosed source at steady-state is 234.1°F. **Not** 150°F as Sky Dragon Slayers insist. The huge difference (or lack thereof) between my first simplistic answer and the more accurate final answer might be informative.

I'll be very surprised and impressed if Lonny **doesn't** respond to this complete analysis like he did last time: by disputing the very first equation I've already written down.

12:29 PM

Dumb Scientist said...

Part 1 of 4.

This comment was copied from here. These original posts have many links, including links to my open-source Sage worksheets so anyone can follow along with my math using a free Sage account.

The heated plate is a sphere with radius 6371 mm, surface area A_h, temperature T_h and emissivity epsilon_h. The enclosing plate is a 1 mm thick concentric shell with emissivity epsilon_c, an inner radius of 6378 mm, surface area A_c1 and temperature T_c1 on the inside, and A_c2 and T_c2 on the outside. The chamber walls at temperature T_c are a concentric sphere with inner radius 6386 mm, so there's a 7 mm gap on both sides of the enclosing shell. The plates and walls are oxidized aluminum, which are treated as gray bodies.

Since the enclosing shell has no edges and has nearly the same area as the heated plate, MIT's infinite plate approximation describes net heat flow (in W/m^2):

net heat flow = sigma*(T_h^4 - T_c^4)/(1/epsilon_h + 1/epsilon_c - 1) (Eq. 2)

At steady-state, net heat flow (in W/m^2) equals the electrical input. Note that MIT's Eq. 2 reduces to my Eq. 1 for blackbodies where epsilon_h = epsilon_c = 1.

The plates and chamber walls are made of oxidized aluminum with emissivity = 0.11.

At steady-state, net heat flow out (in W/m^2) equals "electricity". The first step is to calculate that constant variable "electricity" which describes electrical power per square meter heating the sphere to 150°F without an enclosing shell. I calculated 29.4 W/m^2, which is less than with the simpler blackbody plates because aluminum isn't a perfect emitter or absorber.

SAGE CALCULATIONS:

```
#Calculate constant electrical power/area heating 1st plate.
var('sigma T_c T_h electricity epsilon_h epsilon_c')
eq1 = electricity == sigma*(T_h^4 - T_c^4)/(1/epsilon_h + 1/epsilon_c - 1)
soln1 = solve(eq1.subs(T_c=255.372,T_h=338.706,sigma=5.670373E-8,epsilon_h=0.11,epsilon_c=0.11),electricity)
soln1[0].rhs().n()
```

ANSWER: 29.3986743761843

Can we agree on that? If not, a month ago I said we could use Wikipedia's equation which includes areas. After I mentioned view factors, Jane agreed that the relevant view factor is 1.0 or very close to it. Happily, the relevant view factor is exactly 1.0.

I solved this equation to see how much error was introduced by assuming the areas were negligibly similar:

```
#A_h - area of heated plate (aka Jane's "source")
(4*pi*6.371^2).n()
```

ANSWER: 510.064471909788

```
#A_c - area of chamber walls
(4*pi*6.386^2).n()
```

ANSWER: 512.469109758699

#A_c2 - outer area of enclosing shell
(4*pi*6.379^2).n()

ANSWER: 511.346241712453

#A_c1 - inner area of enclosing shell
(4*pi*6.378^2).n()

ANSWER: 511.185932522526

#Calculate constant electrical power heating 1st plate.
var('sigma T_c T_h A_c A_h F_hc power epsilon_h epsilon_c')
eq1 = power == sigma*(T_h^4 - T_c^4)/((1-epsilon_h)/(epsilon_h*A_h) + 1/(A_h*F_hc) + (1-epsilon_c)/(epsilon_c*A_c))
soln1 = solve(eq1.subs(T_c=255.372,T_h=338.706,sigma=5.670373E-8, epsilon_h=0.11, epsilon_c=0.11, F_hc=1,
A_h=510.064471909788, A_c=512.469109758699),power)
soln1[0].rhs().n()

ANSWER: 15028.4258648090

#Just to compare to the old "electricity" variable: power/A_h.
15028.4258648090/510.064471909788

ANSWER: 29.4637770173238

The difference between this more accurate solution (~29.46 W/m^2) and the earlier solution which neglected the area ratio (~29.40 W/m^2) might be informative. Can we agree on either of these solutions?

If so, we can move on to the next step, which is calculating the final outer surface temperature of the enclosing shell once it reaches steady-state.

12:30 PM

Dumb Scientist said...

Part 2 of 4.

This comment was copied from here.

Once it reaches steady-state, the enclosing shell radiates the same power out as the heated plate did before it was enclosed. But its area is 1.0025 times larger, so its outer temperature is 149.6°F (338.5K) instead of 150.0°F (338.7K):

A_h*T_h^4 = A_c2*T_c2^4 (Eq. 3)

Again, a more accurate answer can be obtained using Wikipedia's equation.

SAGE CALCULATIONS:

#Calculate outer temperature of enclosing shell.
var('sigma T_c T_h A_c A_h F_hc power epsilon_h epsilon_c')
eq1 = power == sigma*(T_h^4 - T_c^4)/((1-epsilon_h)/(epsilon_h*A_h) + 1/(A_h*F_hc) + (1-epsilon_c)/(epsilon_c*A_c))
soln2 = solve(eq1.subs(T_c=255.372,sigma=5.670373E-8, epsilon_h=0.11, epsilon_c=0.11, F_hc=1,
A_h=511.346241712453, A_c=512.469109758699,power=15028.4258648090),T_h)
soln2[0].rhs().n()

ANSWER: 338.629792627809

This is 149.9°F, which shows that my simpler method of accounting for the area ratio underestimated the shell's outer steady-state temperature by ~0.3°F.

12:30 PM

Dumb Scientist said...

Part 3 of 4.

This comment was copied from here.

Now to calculate the enclosing shell's inner temperature. At steady-state, power in = power out through some boundary. This time, draw the boundary within the enclosing shell. Again, constant electrical power flows in. But all the other boundaries we drew were in vacuum, so heat transfer was by radiation. This time the boundary is inside aluminum, so heat transfer out is by thermal conduction.

electricity = k*(T_h - T_c)/x (Eq. 4)

The shell's thickness "x" is 1mm, and the thermal conductivity "k" of aluminum is 215 W/(m*K). We just found that:

Outer shell temperature: 338.629792627809 K (149.864 °F).

So:

Inner shell temperature: 338.629929668632 K (149.864 °F).

Of course, that's a flat plate approximation of heat conduction through a spherical shell, which is derived here. That more accurate equation yields:

SAGE CALCULATIONS:

#Calculate enclosing shell's inner temperature.

```
var('T_c T_h power k r_c1 r_c2')
eq2 = power == 4*pi*k*r_c1*r_c2*(T_h - T_c)/(r_c2 - r_c1)
soln3 = solve(eq2.subs(T_c=338.629792627809,power=15028.4258648090,k=215,r_c1=6.378,r_c2=6.379),T_h)
soln3[0].rhs().n()
```

Inner shell temperature: 338.629929346551 K (149.864 °F).

Now for the final step. Calculate the steady-state temperature of the enclosed heated plate (Jane's "source").

12:30 PM

Dumb Scientist said...

Part 4 of 4.

This comment was copied from here.

Now that we've agreed on the inner shell temperature of ~149.9°F, let's take the last step. Calculate the enclosed source temperature.

Draw a boundary just inside the inner surface of the enclosing shell. Because nothing in the boundary is changing with time, power in = power out. The same constant electrical power flows in as before the shell was added. Net radiative power flows out from the source to the enclosing shell's inner surface.

As before, that net radiative power is described by Wikipedia's equation which accounts for areas and view factors.

SAGE CALCULATIONS:

```
#Completely surrounded by shell with finite conductivity.
var('sigma T_c T_h A_c A_h F_hc power epsilon_h epsilon_c')
eq1 = power == sigma*(T_h^4 - T_c^4)/((1-epsilon_h)/(epsilon_h*A_h) + 1/(A_h*F_hc) + (1-epsilon_c)/(epsilon_c*A_c))
soln4 = solve(eq1.subs(
T_c=338.629929346551,
power=15028.4258648090,
sigma=5.670373e-8,
epsilon_h=0.11,
epsilon_c=0.11,
F_hc=1,
A_h=510.064471909788,
A_c=511.185932522526) #End of constant definitions.
,T_h) #Variable solved for: enclosed source temperature.
soln4[0].rhs().n()
```

The final answer for the enclosed source at steady-state is 385.4 K (234.1°F).

Once again, I'll be very surprised and impressed if Lonny **doesn't** respond to this complete analysis like he did last time: by disputing the very first equation I'd already written down.

12:31 PM

Olaf said...

Bryan, I told you this before, far more than once:

You can use Sage to your heart's content, but you are writing here for PEOPLE to read.

I am not now, nor have I ever been, interested in reading a jumble of input or output from Sage that is not explained in a cohesive argument in English.

I have explained my position adequately. You can accept it or not as you please.

Do it in the STANDARD manner: start with complete specifications and description of the problem (you did this before so that should not be an issue), explain your premises, then describe your chain of logic and (in human readable form) math, leading from your premise to your conclusion.

This is the last time I am going to say it. I am not interested in chunks you have pulled from social media, as you have had a notable (and many times publicly noted) habit of "out-of-context" argument.

Write it up. Lay it all out. If you don't want to, that's your call, but I have NO obligation to participate.

YOU apparently want this discussion. I certainly did not ask for it.

12:45 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-11: "You can use Sage to your heart's content, but you are writing here for PEOPLE to read. I am not now, nor have I ever been, interested in reading a jumble of input or output from Sage that is not explained in a cohesive argument in English. I have explained my position adequately. You can accept it or not as you please. Do it in the STANDARD manner: start with complete specifications and description of the problem (you did this before so that should not be an issue), explain your premises, then describe your chain of logic and (in human readable form) math, leading from your premise to your conclusion."

Lonny, I just started with complete specifications and description of the problem, explained my premises, and described my chain of logic and math in human readable form.

The Sage worksheets are simply a bonus, to allow anyone who likes open source software to learn how to crank through the solution process on their own. If you don't like them, you can just ignore them. Anyone who isn't "fussy" should be able to verify the math using their own calculator or computer algebra system, if they don't want to use the precalculated and tested Sage worksheets that I'm providing on a silver platter.

12:51 PM

Olaf said...

My whole point -- AGAIN -- is that you present your arguments in a single, cohesive document and chain of reasoning, which is not only not an unreasonable thing to ask, but the USUAL way of doing things.

David Appell is not an audience I want to impress or even have cause to care about. I do not ask this for myself. I want your ENTIRE argument here, in public, in more-or-less standard human-readable format, for OTHER PEOPLE to see.

As YOU already know, I already know what your argument is. I want OTHER PEOPLE to be able to see and read it in its entirety, so they can understand it, think about it, and discuss it. Cherry-picked links to other links of your own choosing do not meet that criterion.

If you choose not to do that, it is a choice of your own making. Your protestations and prevarications do not impress.

2:31 PM

Olaf said...

I am also amused that you continue to cite MIT's "infinite planes in equilibrium" equation for transfer, when the actual problem is not infinite, has a significant areal difference, and... as I have told you many times in past discussions, IS NOT EVEN REMOTELY IN EQUILIBRIUM.

But I have no intention of continuing to argue here. That is a simple illustration of why I want your ENTIRE argument, from start to finish, in a single document that can be shared with others. Because little errors like these tend to add up. I want people to see them.

2:56 PM

David Appell said...

Lonny, it is entirely unreasonable to expect DS to write an entire manuscript for you when you won't even discuss the very first equation.

You've done nothing here but evade discussing the science. Ironic, for someone who's so sure it's all wrong....

3:11 PM

Olaf said...

I want everyone to be able to see how you eschewed textbook treatments of the problem, and instead compiled irrelevant equations from HERE, and nonsequiturs from THERE, into a seemingly convincing argument.

Which you now seem reluctant to reveal, instead choosing to show only the bits you want others to see.

You don't want everybody to see how you tried to pass a heat-transfer equation off as radiated power?

Or how you tried to claim you had an equation to show how "electrical power" was being used to maintain a "temperature differential"... when in this context there was no reference temperature?

Etc.

I'll wait.

3:19 PM

Olaf said...

David:
Given Killet's and my long past history with this issue, I have perfectly reasonable justifications for asking just exactly that.

You, on the other hand, haven't been involved long enough for me to care about your opinion... or for you to even justifiably have one.

3:22 PM

Olaf said...

And in recent comments I have illustrated those reasons. I have no intention of sitting here arguing with Killet's cherry-picked PIECES of his argument, or deciphering his SAGE input and output.

I want his argument in its entirety for OTHER PEOPLE to see and understand.

That is my entire reason for being here. If he doesn't want to do that, fine. I'm not "demanding" it, I'm simply saying that I won't accept anything less if you want my participation. I'll simply go away and have nothing further to do with this.

3:30 PM

David Appell said...

Lonny, no, your request is not reasonable. I'm not following this conversation because you aren't contributing anything to it. You'd rather play games instead of discussing science. DS has been far more patient with you than you deserve, and you won't even discuss the most basic of arguments based on conservation of energy. He has given lengthy replies, and all you've done is endlessly and immaturely threaten to leave. Just like you did on Twitter -- only to come back every time.

Start discussing science. Start with the first equation. Either agree with it, or write down the equation you think is correct.

3:31 PM

David Appell said...

Lonny: I did not approve your last comment.

It's time to start discussing the science. There are over 90 comments here, and yours are mostly whining and complaining about this or that.

You're more then welcome to discuss the science. DS has put forth a lot of it. But not more pointless, evading comments.

3:42 PM

David Appell said...

Start with this:

(1) power in = electrical heating power + radiative power in from the chamber walls

3:44 PM

David Appell said...

Lonny: I also did not approve your latest comment, because it did not discuss the science.

You have had (and still have) every opportunity to discuss science here. You have consistently evaded and avoided doing so.

Complain on your own blog. This is a blog about science.

4:00 PM

David Appell said...

Or, Lonny, you can discuss the reason this post was created: to discuss your claim on Twitter that

"This is RADIATIVE heat. CO2 can't "reach out" and affect radiative output of surface"

4:01 PM

David Appell said...

Lonny: I also did not approve your latest comment, which yet again threatens to storm out of here.

Do you agree with equation (1)? Last chance to answer.

4:03 PM

Olaf said...

Simply ask Killett to give you the precise dimensions and other parameters of our previous discussion re: Spencer, and his final solution for temperature of the heat source fully enclosed in a gray-body sphere with his specified emissivity.

Work through the math of the radiative heat transfer, from the heat source, into and out of the passive hollow gray-body sphere, then to the chamber walls.

The numbers don't balance, using simple textbook radiative heat-transfer physics of gray bodies.

Don't ask me to do the math for you. If Killett isn't willing to give the problem a thorough treatment from start to finish, then I won't bother either.

4:31 PM

David Appell said...

In what way don't the numbers balance?

(Yes, asserting that requires you produce the math. So start.)

4:41 PM

Olaf said...

Fine. Then you will have to give me time to do it.

I will make some other relevant comments then, when I do.

As I stated before, my time this weekend is limited. So you must have a little patience.

5:03 PM

Olaf said...

I told you I would do the relevant calculations for you, David, but you will have to have some patience.

Are you not going to post that, either?

5:27 PM

David Appell said...

OK, whatever. Personally I think it's ridiculous to write up a manuscript to reply to a Tweet or blog comment, or to expect someone else to.

And after all this I only half-remember what the points of contention were or why any manuscript is needed, so I reserve the right to tune out and instead go read some papers or visit my niece.

5:39 PM

Olaf said...

My first comment is this:

I asked Bryan a long time ago to justify his use of the MIT "infinite plane" transfer equation, which he refers to here in his Part 1 of 4, labeled Eq(2).

He does not cite its origin here, but he did before. This is one reason why I stated before that I wanted his ENTIRE argument, from start to finish, so that people can see his reasoning.

That equation relates to theoretical parallel infinite planes of gray-body material IN THERMAL EQUILIBRIUM.

As I have often pointed out to him, at no time is the system in question in a state of equilibrium. At all times it is in an artificially maintained steady-state of DISequilibrium.

So before we go any further, I will ask him to justify the use of an equation that would not normally be considered to apply in these circumstances, when other, more relevant, textbook equations were easily available to him.

I think this is a fair question, and I don't see much point in going forward until it is answered.

6:09 PM

Dumb Scientist said...

David Appell, 2015-04-11: "... after all this I only half-remember what the points of contention were..."

That might actually be the point, which is why it would probably be counter-productive to answer Lonny's latest round of nonsensical objections. I've already answered them before and Lonny just keeps repeating them anyway, so why should I think that answering them again will have any effect other than helping Lonny obfuscate the central point of contention?

Once again, conservation of energy says:

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

Since radiative power in depends on the chamber wall temperature, this equation says that electrical heating power at steady state depends on the chamber wall temperature.

After I wrote this, Lonny said:

Lonny Eachus, 2015-04-11: "I do not 'disagree' with Killett's statements so far."

Lonny Eachus, 2015-04-11: "... they want me to argue about simple math and other crap nobody disputes. Apparently they think I am some kind of idiot who will stumble over addition problems."

Your words, not mine.

Lonny Eachus, 2015-04-11: "They insist I prove that I "agree" with kindergarten-level physics: power in = electrical heating power + radiative power in from the chamber walls"

Lonny, I'm asking you to simply say if you agree with the first energy conservation equation required to solve this problem because you've spent the last few months adamantly insisting on this nonsensical equation instead:

Jane/Lonny Eachus, 2014-10-08: "My energy conservation equation is this: electrical power in = (epsilon * sigma) * T^4 * area = radiant power out"

I've repeatedly told Lonny that his "energy conservation equation" violates conservation of energy because it doesn't match what Lonny Eachus calls the "kindergarten-level physics" equation I derived above.

Now that Lonny Eachus can't use that equation without violating what he calls "kindergarten-level physics", I'm curious to see how he'll keep insisting that the enclosed plate doesn't warm.

8:02 PM

Olaf said...

I see that

(A) you have chosen to not post my question regarding Bryan's use of an equation from the very beginning that is irrelevant to the circumstances of the problem I let him define himself.

(B) You DID, however, post yet another of Bryan's argument with an OLD statement of mine that he yet again out of context.

(C) The comment I did post, which you have chosen to censor, was entirely about Bryan's "science"... which you insisted upon. I have recorded and already shown it to others anyway, it is now part of the public record, and I intend to publish it myself later as a matter of copyright "fair use" at an unspecified future date.

My conclusion is that (D) you are indeed wasting my time, your interest is not in promoting or arguing SCIENCE, but rather the evidence appears to show that instead you set this up as a one-sided insult-fest in an attempt to make me look bad... given that you refused to post my valid objection, yet still insist that I "agree" to silly gradeschool-level

statements that are an insult to an adult discussion of the real issue under discussion.

Why did Bryan use an invalid equation FROM THE BEGINNING?

Explain.

9:58 PM

Olaf said...

Actually, don't bother to explain. For reasons that I think most people will readily see, I am done here.

10:10 PM

Olaf said...

Final comment:

I have noticed problems with the comment system here, so I retract the implication that "censorship" was intentional... however, it did appear rather suspicious.

"Never attribute to malice..." as the saying goes.

I wish all here a happy weekend. I know I am going to have one.

10:18 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-11: "... you have chosen to not post my question regarding Bryan's use of an equation from the very beginning that is irrelevant to the circumstances of the problem I let him define himself. ... Why did Bryan use an invalid equation FROM THE BEGINNING?"

I didn't. Not just because MIT's equation is perfectly valid here, but also because I first used what Lonny calls my "kindergarten-level physics" equation to solve a simple blackbody example FROM THE BEGINNING and found that the enclosed plate warms to a steady-state temperature of ~235°F.

MIT's equation (and others) led to a more accurate answer of 234.1°F.

Lonny Eachus, 2015-04-11: "I am also amused that you continue to cite MIT's "infinite planes in equilibrium" equation for transfer, when the actual problem is not infinite, has a significant areal difference..."

If Lonny Eachus really doesn't disagree with my "kindergarten-level physics" equation, then he should ponder why its ~235°F answer isn't significantly different than the answer which takes the area differences into account, giving 234.1°F.

Jane/Lonny Eachus, 2014-09-07: "... Heat transfer requires a temperature gradient, and therefore thermodynamic non-equilibrium (as we established early on). I was hoping you would catch on that this also implies that power-in = power-out is not necessarily true, and in fact that is probably a very rare exception. Therefore, you aren't going to prove anything with this approach. I wanted to stop you before you wasted more of your time."

Lonny Eachus, 2015-04-11: "I am also amused that you continue to cite MIT's "infinite planes in equilibrium" equation for transfer, when the actual problem ... IS NOT EVEN REMOTELY IN EQUILIBRIUM."

Once again, note that my definition of equilibrium is identical to this one: "Class 6- Equilibrium Temperature: Equilibrium means no change with time. ... In equilibrium, we expect ENERGY IN = ENERGY OUT ..."

Lonny Eachus, 2015-04-11: "... You DID, however, post yet another of Bryan's argument with an OLD statement of mine that he yet again out of context. ..."

In that case, let's expand the context:

Jane/Lonny Eachus, 2014-10-08: "... I've given it to you about 30 times now. My energy conservation equation is this: electrical power in = (epsilon * sigma) * T^4 * area = radiant power out ..."

Lonny Eachus, 2015-04-11: "... you refused to post my valid objection, yet still insist that I "agree" to silly gradeschool-level statements that are an insult to an adult discussion of the real issue under discussion. ..."

Lonny, by your own admission you've insulted "an adult discussion of the real issue under discussion" about "30 times now".

If you've actually decided to finally stop doing that, I'll be very impressed. And once again I'm curious to see how you'll keep insisting that the enclosed plate doesn't warm without using your insulting and nonsensical equation which violates conservation of energy.

10:52 PM

Olaf said...

Last -- and I very definitely mean LAST -- comment here:

Just knock it off Bryan. You don't get to use an equation for equilibrium in non-equilibrium situations, without fully justifying WHY you used it, when you could have simply used TEXTBOOK non-equilibrium equations instead.

I repeat that in my past arguments with you I used textbook treatment of the situation while you persistently refused to do the same.

The fact that you found an equation somewhere does not mean you can just plop it into some heat-transfer problem and use it willy-nilly. Given that it was specifically intended for equilibrium situations, you have to have a justification for using it elsewhere.

So now we come to my "baiting", which I admit to, publicly. I purposely stated that "I do not dispute" your silly

gradeschool physics statements because I knew, from past experience, that you would fallaciously interpret "do not dispute" with "agree". They are not the same things.

I made a statement about cavity physics that may not be quite true, because I suspected you would use it to ILLUSTRATE, in your own words, to us all, that indeed equilibrium is a special case and different from the one under discussion.

I do apologize for the baiting, but I had reason for it and you are Oh, so predictable.

The fact that I do not dispute a statement of yours at one particular time does not obligate me to not dispute it at some later time. Nor does it mean that I agree that is correct. I am happy to let you continue your own arguments until you "hang yourself", as the saying goes, which you have done on a rather regular basis.

You were trying to set me up, and you did not succeed.

If you want to have an argument about the science, then you will have to START with some valid science, which means you should use textbook equations to deal with textbook situations, not something you arbitrarily pulled off the internet which is specific to thermal equilibrium.

It has been years. I am not willing to wait any longer. Goodbye, and good riddance. I shall not respond to any more of this BS.

12:34 AM

Dumb Scientist said...

Lonny Eachus, 2015-04-12: "... Just knock it off Bryan. You don't get to use an equation for equilibrium in non-equilibrium situations, without fully justifying WHY you used it, when you could have simply used TEXTBOOK non-equilibrium equations instead. ... The fact that you found an equation somewhere does not mean you can just plop it into some heat-transfer problem and use it willy-nilly. Given that it was specifically intended for equilibrium situations, you have to have a justification for using it elsewhere. ... If you want to have an argument about the science, then you will have to START with some valid science, which means you should use textbook equations to deal with textbook situations, not something you arbitrarily pulled off the internet which is specific to thermal equilibrium. ..."

Good grief, Lonny. Once again, I just showed you that my definition of equilibrium is identical to this one: "Class 6-Equilibrium Temperature: Equilibrium means no change with time. ... In equilibrium, we expect ENERGY IN = ENERGY OUT ..."

Jane/Lonny Eachus, 2014-09-03: "... That is a steady state. It is NOT "equilibrium". They are different things. ..."

Lonny, once again we're just using different words to describe the concept that there is no change with time.

Jane/Lonny Eachus, 2014-09-03: "... one of the requirements of thermodynamic equilibrium is that all surfaces be at the same temperature ..."

No, Lonny. Equilibrium means no change with time, as you can see by reading that quote from the University of Colorado tutorial I've repeatedly shown you. In a closed system with no external energy input, the only way for the system to reach a point of "equilibrium" where there's no change with time is for all surfaces to be at the same temperature.

But in an open system with an external energy input, it's possible for the system to reach a point of "equilibrium" where there's no change with time even if all surfaces **aren't** at the same temperature. Note that Spencer's thought experiment (and the Earth system) is an open system with external energy input.

For example, I've already showed you this quote from Spencer's original thought experiment: "Eventually the second plate will also reach a state of equilibrium, where its average temperature (let's say 100 deg. F) stays constant with time."

While solving a similar thought experiment, Prof. Steve Carson also used "equilibrium" to mean no change with time.

But it's really ironic that the first example MIT applies their final equation to is a thermos bottle where the inside wall is hotter than the outside wall.

So before Lonny Eachus lectures me about using MIT's equation, he first has to lecture MIT about using their own equation in a situation where not all surfaces are at the same temperature.

6:03 AM

Dumb Scientist said...

Lonny Eachus, 2015-04-12: "I made a statement about cavity physics that may not be quite true..."

Are you referring to the nonsensical equation that you've repeated about 30 times? The one which violates what you call "kindergarten-level physics" and is "an insult to an adult discussion of the real issue under discussion"?

Yeah, that equation **may** not be quite true. Warning: the preceding sentence **may** contain extreme understatement.

Lonny Eachus, 2015-04-12: "I repeat that in my past arguments with you I used textbook treatment of the situation while you persistently refused to do the same."

I repeat that you've misunderstood your textbook and have been lecturing physicists for months using a nonsensical equation which you now seem to be slowly realizing violates what you call "kindergarten-level physics" and is "an insult to an adult discussion of the real issue under discussion"?

Once again I'm curious to see how you'll keep insisting that the enclosed plate doesn't warm **without** using your insulting and nonsensical equation which violates conservation of energy.

6:06 AM

David Appell said...

Lonny Eachus wrote:
"I have recorded and already shown it to others anyway, it is now part of the public record, and I intend to publish it myself later as a matter of copyright "fair use" at an unspecified future date."

Oh dear. Now I am quaking in my boots. (Well, socks -- it's early still.)

9:14 AM

David Appell said...

DS wrote:
"That might actually be the point, which is why it would probably be counter-productive to answer Lonny's latest round of nonsensical objections."

I agree -- Lonny's continued evasions, threats to leave, threats to record the conversation, ridiculous demands, etc all indicate he's not interested in discussing the science. Instead he's actively avoiding discussing the science.

I've seen this kind of thing before, from Slayers especially. They are so very sure the standard science is wrong, but when you challenge them they keep repeating their same argument ad nauseum that heat can't flow from cold to hot, and stick their fingers into their ears at hearing anything else.

9:20 AM

David Appell said...

Lonny wrote:
"I asked Bryan a long time ago to justify his use of the MIT "infinite plane" transfer equation...."

And he gave it long ago:

"Since the enclosing shell has no edges and has nearly the same area as the heated plate, MIT's infinite plate approximation [archive.today] describes net heat flow...."

http://slashdot.org/comments.pl?sid=5589981&cid=47832871

9:35 AM

David Appell said...

DS quoted:
"Jane/Lonny Eachus, 2014-10-08: "My energy conservation equation is this: electrical power in = (epsilon * sigma) * T^4 * area = radiant power out""

DS is right, Lonny -- your equation is wrong, because it doesn't account for radiant energy falling on the inner plate, coming from the outer chamber.

The outer chamber radiates. Just where do you think that radiation goes?

9:43 AM

Dumb Scientist said...

Lonny Eachus, 2015-04-12: "I asked Bryan a long time ago to justify his use of the MIT "infinite plane" transfer equation, which he refers to here in his Part 1 of 4, labeled Eq(2). He does not cite its origin here, but he did before. ..."

Nonsense, Lonny. At 6:03 AM this morning, I said that the first example MIT applies their final equation to is a thermos bottle where the inside wall is hotter than the outside wall.

Lonny Eachus, 2015-04-12: "... This is one reason why I stated before that I wanted his ENTIRE argument, from start to finish, so that people can see his reasoning. That equation relates to theoretical parallel infinite planes of gray-body material IN THERMAL EQUILIBRIUM. As I have often pointed out to him, at no time is the system in question in a state of equilibrium. At all times it is in an artificially maintained steady-state of DISequilibrium. So before we go any further, I will ask him to justify the use of an equation that would not normally be considered to apply in these circumstances, when other, more relevant, textbook equations were easily available to him."

Nonsense, Lonny. Just click the links to MIT's equation which I've repeatedly given you and search for "equilibrium". It's not there.

That's why the first example MIT applies their final equation to is a thermos bottle where the inside wall is hotter than the outside wall, and temperatures aren't constant with time.

Again, before Lonny Eachus lectures me about using MIT's equation, he first has to lecture MIT about using their own equation in a situation where not all surfaces are at the same temperature.

And once again I'm curious to see how Lonny will keep insisting that the enclosed plate doesn't warm without using his nonsensical equation which violates conservation of energy.

9:45 AM

David Appell said...

I also agree with DS that the equation for Q-dot given in Wikipedia

http://en.wikipedia.org/wiki/Thermal_radiation#Radiative_heat_transfer

works for the general case and reduces to the infinite plane case for spheres with nearly equal areas, with some small error of order A2/A1-1.

10:12 AM

David Appell said...

And I have no idea what this is supposed to mean

"As I have often pointed out to him, at no time is the system in question in a state of equilibrium. At all times it is in an artificially maintained steady-state of DISequilibrium."

since the electrical power supply is assumed constant and continuous.

10:16 AM

Dumb Scientist said...

I think that's the same open vs. closed system confusion I tried to address at 6:03 AM.

10:18 AM

David Appell said...

Ah. Yes, Lonny's sentence

"... one of the requirements of thermodynamic equilibrium is that all surfaces be at the same temperature ..."

is not what's meant by "equilibrium" when there is an external source of heat/power.

10:35 AM

Olaf said...

David:

"And I have no idea what this is supposed to mean"

You do know what thermal equilibrium is, yes?

The system described here is NOT in THERMAL EQUILIBRIUM at any time. The central heated sphere is the sole heat source in this system. It is maintained at a hotter temperature than the passive sphere, which in turn is hotter than the chamber walls, which are actively cooled to 0ºC.

However, since Bryan has shown the equation to be used in other contexts involving non-equilibrium, I will concede that point for now. I am just loathe to use a more complex equation than necessary to gain an adequate result.

This brings up Bryan's earlier comment about my mention of a constant term. Since throughout this system, emissivity is the same for all bodies, $\varepsilon 1 = \varepsilon 2 = 0.11$, and we agreed up front to the condition that emissivity does not change with temperature for these gray bodies (a reasonable assumption, if not strictly true, then:

Therefore, in his equation, $1/\varepsilon + 1/\varepsilon - 1 = 1/0.11 + 1/0.11 - 1 = 17.181818$. At all times, for any of these transfer equations between to bodies, anywhere in this system. Every time.

So IN THIS CONTEXT... this context only, I am not arguing the general case... the denominator in Bryan's equation is a constant equal to 17.181818...

And also therefore, when you have two such expressions on the opposite sides of an equal sign, e.g. X/17.181818 = Y/17.181818, where X and Y are known to be positive reals, it is perfectly, algebraically acceptable to cancel the denominators. Bryan has never made a credible argument about why he feels that is not so, IN THIS CONTEXT. If Bryan disagrees with that comment, I expect him to clearly explain why he feels the denominator is not constant IN THE CONTEXT OF THIS SYSTEM.

Bryan: "Once again, you misinterpreted the textbook equations. Temperature isn't determined by the Stefan-Boltzmann law. Temperature is determined by internal energy, which is determined by conservation of energy."

I feel obligated to repeat, explain why this is NOT valid for a gray body with known emissivity: total radiant power out = Area * $\varepsilon\sigma T^4$

I do not claim temperature is "determined by" the Stefan-Boltzmann law. I only claim that the Stefan-Boltzmann law is valid. If temperature is known, radiant power out can be calculated. If radiant power output is known, temperature can be calculated. I make no claim beyond that.

Once again, Bryan appears to be trying to misrepresent my comments. If Bryan disagrees with the basic physics equation I have just stated above, I would ask him to explain precisely why, without beating around the bush.

I will have more to say later. I am willing to concede Bryan's point about the transfer equation, if it means we can move on. But I want an answer to the other questions I have asked here:

1) Bryan, why is my simple algebra above regarding the denominators not valid IN THIS CONTEXT? And

2) do you claim the S-B relation I wrote out above is not valid? If yes, please explain why.

Under the circumstances, I will have more to say later.

1:04 PM

Olaf said...

Further, in regard to my statement about the denominators:

Bryan, given the conditions of the system being discussed, can you show me where the heat transfer equation you use is discontinuous? What realistic values from this system might lead to division by zero, or some other invalid result?

I'd be interested to find out.

1:14 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-12: "I feel obligated to repeat, explain why this is NOT valid for a gray body with known emissivity: total radiant power out = Area * $\varepsilon\sigma$T^4 ... do you claim the S-B relation I wrote out above is not valid? If yes, please explain why."

Good grief, Lonny. I've never said it isn't valid. In fact, I've repeatedly told you that I agree with the Stefan-Boltzmann law. So it's hard to believe that Lonny Eachus is asking this question in good faith.

Lonny Eachus, 2015-04-12: "... And also therefore, when you have two such expressions on the opposite sides of an equal sign, e.g. X/17.181818 = Y/17.181818, where X and Y are known to be positive reals, it is perfectly, algebraically acceptable to cancel the denominators. Bryan has never made a credible argument about why he feels that is not so, IN THIS CONTEXT. If Bryan disagrees with that comment, I expect him to clearly explain why he feels the denominator is not constant IN THE CONTEXT OF THIS SYSTEM. ... Bryan, why is my simple algebra above regarding the denominators not valid IN THIS CONTEXT? "

Good grief, Lonny. I've never said the denominator is not constant. Assuming Lonny is somehow asking this question in good faith, Lonny might be misinterpreting my insistence that "Power radiated in from the chamber walls needs to be accounted for using one term. Power radiated out from the source needs to be accounted using another."

I was trying to explain that Lonny couldn't cancel terms (not denominators) to obtain his incorrect "energy conservation equation". That's why the correct energy conservation equation is:

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

Since radiative power in depends on the chamber wall temperature, this equation says that electrical heating power at steady state depends on the chamber wall temperature.

Lonny Eachus, 2015-04-12: "Bryan, given the conditions of the system being discussed, can you show me where the heat transfer equation you use is discontinuous? What realistic values from this system might lead to division by zero, or some other invalid result?"

Lonny, you're the only one here insisting that heat transfer isn't a gradual process:

Jane/Lonny Eachus, 2014-09-20: "... all the way up to the exact point thermal equilibrium is achieved, all radiant power is a result of electrical power, therefore the power input and power output are constant. It is not a "gradual" process. ..."

Once again, mainstream physics shows that electrical heating power gradually decreases to zero as the chamber wall temperature increases. That's how uncooled IR detectors can see cooler objects.

Once again I'm curious to see how Lonny will keep insisting that the enclosed plate doesn't warm without using his nonsensical equation which violates conservation of energy.

1:22 PM

Olaf said...

And further yet, since Bryan has a tendency to be needlessly pedantic, I will qualify my other statement too:

When I say that if temperature is known, radiant power output can be calculated, and if radiant power output is known, then temperature can be calculated, I mean it IN CONTEXT.

That is to say: we have known, fixed emissivities. We have known, fixed dimensions. We have a known Stefan-Boltzmann constant.

So at all times, we know all terms in the equation except the one we're solving for.

1:36 PM

Olaf said...

"Good grief, Lonny. I've never said it isn't valid. In fact, I've repeatedly told you that I agree with the Stefan-Boltzmann law. So it's hard to believe that Lonny Eachus is asking this question in good faith."

I'm ASKING it, Bryan, because YOU claimed that I claimed that the Stefan-Botlzmann law "determines" temperature.

That is not something I have claimed. If you thought so, you misunderstood. Period. End of story.

1:38 PM

Olaf said...

"Good grief, Lonny. I've never said the denominator is not constant. Assuming Lonny is somehow asking this question in good faith, Lonny might be misinterpreting my insistence that "Power radiated in from the chamber walls needs to be accounted for using one term. Power radiated out from the source needs to be accounted using another."

You appear to be contradicting yourself. If this is true, then why did you claim further up the page that I was invalidly attempting to cancel a constant?

Are you referring to some other situation? I certainly do not recall one.

1:40 PM

Olaf said...

Pardon me... I don't see that comment now. I could have sworn it was there... very strange!

Nevertheless, you DID state that elsewhere, at another time. I have a copy of your comment.

1:43 PM

Olaf said...

"Once again, mainstream physics shows that electrical heating power gradually decreases to zero as the chamber wall temperature increases. That's how uncooled IR detectors can see cooler objects."

And once again, you continue to provide a grossly oversimplified and misleading description of how they actually work. That was why I sent you to this reference in the first place.

Our discussion is not about minute quantum effects or polarization charges. If you want to go there, take it somewhere else. I have no interest in arguing about it.

2:01 PM

Olaf said...

Damnit, wrong link.

The reference I meant to link to is here.

2:09 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-12: "You appear to be contradicting yourself. If this is true, then why did you claim further up the page that I was invalidly attempting to cancel a constant? ... Pardon me... I don't see that comment now. I could have sworn it was there... very strange! Nevertheless, you DID state that elsewhere, at another time. I have a copy of your comment."

Nonsense, Lonny. You have a copy of this:

Jane/Lonny Eachus, 2014-09-10: "... Factor out (e*s) from both sides. (Despite khayman80's assertion that we cannot do this, yes we can. It is the same scalar and the same constant on both sides.) ..."

Once again, I never asserted that. In fact, I repeatedly showed Jane an equation derived by factoring out the sigmas and epsilons from both sides. Only Jane/Lonny Eachus could repeatedly quote that equation and even agree with it, then accuse me of asserting the opposite.

I even copied that equation here on this page, once again showing that the denominator can be factored out from both sides. And yet Lonny continues to make this bizarre claim.

Lonny Eachus, 2015-04-12: "... Our discussion is not about minute quantum effects or polarization charges. If you want to go there, take it somewhere else. I have no interest in arguing about it. ..."

That's fortunate, because Jane/Lonny Eachus is the only one here who doesn't seem to understand that IR detectors don't have to depend on quantum effects:

Jane/Lonny Eachus, 2014-10-03: "Via a QUANTUM EFFECT, you fucking moron. ..."

Once again, charming. As I just explained, IR detectors don't have to depend on quantum effects. Classical mainstream physics allows a temperature-controlled source to detect IR from the cooler chamber walls as follows:

electricity = (e*s)*(T1^4 - T4^4)

If the required electrical heating power is 82.1 W/m^2, then the chamber wall is at absolute zero (-459.7F).

If the required electrical heating power is 55.6 W/m^2, then the chamber wall is at 0F.

If the required electrical heating power is 27.8 W/m^2, then the chamber wall is at 90F.

If the required electrical heating power is 0.0 W/m^2, then the chamber wall is also at 150F.

If Jane/Lonny Eachus **actually** agreed with these "kindergarten-level physics", then he'd understand that uncooled IR detectors don't have to depend on quantum effects to detect cooler objects.

Once again I'm curious to see how Lonny will keep insisting that the enclosed plate doesn't warm **without** using his nonsensical equation which violates conservation of energy.

2:14 PM

David Appell said...

Lonny wrote:
"The system described here is NOT in THERMAL EQUILIBRIUM at any time. The central heated sphere is the sole heat source in this system. It is maintained at a hotter temperature than the passive sphere, which in turn is hotter than the chamber walls, which are actively cooled to 0°C."

You're wrong. Two objects do not have to be at the same temperature to be in thermal equilibium. They just need to be in a steady state.

2:26 PM

David Appell said...

Lonny wrote:

"If radiant power output is known, temperature can be calculated."

But you don't know the radiative power output. It depends on how much power comes from electricty, plus how much power comes from the surrounding shell.

Like DS says, temperature depends on internal energy, which is determined by conservation of energy.

I'll ask again: what do you think happens to the radiation from the outer shell? Where does it go?

2:42 PM

Olaf said...

David, you're starting to sound like Bryan.

Wikipedia:

"Two physical systems are in thermal equilibrium if no heat flows between them when they are connected by a path permeable to heat. Thermal equilibrium obeys the zeroth law of thermodynamics. A system is said to be in thermal equilibrium with itself if the temperature within the system is spatially and temporally uniform."

Our physical systems ARE connected by a path permeable to heat: empty space is permeable to radiation. Heat IS flowing between them. It is temperally but not spatially uniform.

So BY DEFINITION, the system under discussion is not in thermal equilibrium.

"But you don't know the radiative power output. It depends on how much power comes from electricty, plus how much power comes from the surrounding shell."

I stated that if all the terms of the Stefan-Boltzmann relation I gave above are known, then the unknown can be solved for.

Why are we misunderstanding this simple comment?

While it might be nice to know, I DON'T NEED TO KNOW what the electrical power in is, if the heated sphere is SPECIFIED to be at a particular temperature, as it is in the beginning of the experiment.

The temperature is SPECIFIED in the initial conditions to be 338.7°K at steady-state.

We know the area. The dimensions were specified by Bryan.

We know the emissivity. Also specified by Bryan.

We know the Stefan-Botlzmann constant: (5.6704 * 10^-8 W/m^2) / K^4

Given these SPECIFIED values, we can calculate radiative power out of a gray body, which is equal to Area * $\varepsilon\sigma T^4$

This Stefan-Boltzmann relation gives us a simple, calculable relationship between thermodynamic temperature and radiative heat output. All required parameters are known.

Is there anything else about that which is unclear? Because I don't understand why any of it should be unclear. Are you disputing the Stefan-Boltzmann law?

4:17 PM

Olaf said...

Correction: "It is TEMPORALLY but not spatially uniform."

We don't want to get time and temperature confused because of a typo.

4:19 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-12: "While it might be nice to know, I DON'T NEED TO KNOW what the electrical power in is, if the heated sphere is SPECIFIED to be at a particular temperature, as it is in the beginning of the experiment."

But the temperature of the heated sphere isn't specified to be constant. Which means the radiative power out of the sphere isn't specified to be constant. Only the electrical (or Lonny's horse fart) power is specified to be constant.

So you absolutely DO NEED TO KNOW what the electrical heating power is.

Lonny Eachus, 2015-04-12: "Given these SPECIFIED values, we can calculate radiative power out of a gray body, which is equal to Area * $\varepsilon\sigma$T^4 This Stefan-Boltzmann relation gives us a simple, calculable relationship between thermodynamic temperature and radiative heat output. All required parameters are known. Is there anything else about that which is unclear? Because I don't understand why any of it should be unclear. Are you disputing the Stefan-Boltzmann law?"

Lonny, once again nobody's disputing the Stefan-Boltzmann law! It's just that we don't know the final "radiative power out" because that's not held constant, so the Stefan-Boltzmann law doesn't have enough known parameters to solve for the temperature.

To solve for the temperature of the heat source, it's important to remember that temperature is determined by internal energy. And internal energy is determined by conservation of energy.

If you really don't dispute the "kindergarten-level physics" above, you'll be able to calculate the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls. Note that those "kindergarten-level physics" show that your calculation has to include the chamber wall temperature. What electrical heating power do you calculate, Lonny?

4:30 PM

Olaf said...

"Once again, charming. As I just explained, IR detectors don't have to depend on quantum effects. Classical mainstream physics allows a temperature-controlled source to detect IR from the cooler chamber walls as follows:"

You didn't "explain" it, you asserted it. You show nice equations but you neglect the fact, as EXPLAINED by both your own source and mine, that they DON'T work that way.

If they did, they would be a damned sight cheaper and easier to build. Also, it wouldn't be necessary to build cooled thermal imagers to get better results.

I'm not going to concede this one unless you can show me an example of a real, practical device that works in exactly the simple manner you claim.

They don't work in the simple manner you claim. It is just plain not a matter of simple radiation absorption causing straightforward macroscopic effects like temperature change or electrical power variations. There is a lot more going on inside than you are implying, like for example background noise measurements and internal references.

The reference I provided DOES explain how real-world thermal imagers and detectors work.

4:43 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-12: "I'm not going to concede this one unless you can show me an example of a real, practical device that works in exactly the simple manner you claim."

Sure, I've got one next to my mechanical Babbage difference engine in the hanger of my Death Star.

Lonny, if you actually can't concede this simple point then it looks like you really do dispute these "kindergarten-level physics":

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

Since radiative power in depends on the chamber wall temperature, this equation says that electrical heating power at steady state depends on the chamber wall temperature.

Lonny, that's all the physics you need to see that uncooled IR detectors don't have to depend on quantum effects to detect cooler objects.

If you really don't dispute the "kindergarten-level physics" above, you'll be able to calculate the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls. Note that those "kindergarten-level physics" show that your calculation has to include the chamber wall temperature. What electrical heating power do you calculate, Lonny?

4:47 PM

Dumb Scientist said...

And I do mean hanger, not hangar. My reasons are mysterious and ineffable, as befits a Death Star owner.

4:51 PM

Olaf said...

"But the temperature of the heated sphere isn't specified to be constant."

It is at the beginning of the experiment, in the SPECIFIED initial conditions. I did not claim anything else. Just STOP deliberately misconstruing my words.

"Which means the radiative power out of the sphere isn't specified to be constant."

EXCEPT at the steady-states which are clearly described in the experiment. Those are SPECIFIED conditions of the experiment. Do you dispute this? Explain where I stated anything false.

"Only the electrical (or Lonny's horse fart) power is specified to be constant."

At the beginning of the experiment, the heated element is SPECIFIED, as a condition, to be a CONSTANT temperature in steady-state, before the passive plate is added.

Do you dispute this?

AFTER the plate is added, holding that input power constant, the system is again allowed to return to steady-state, which means the temperature is also AT THAT POINT again constant. This is a SPECIFIED CONDITION of the experiment.

Do you dispute this? Or you just wasting everybody's time again? I warn you, I will not put up with that kind of crap anymore.

Nobody is claiming that between the initial steady-state and the final steady-state, nothing changes. If nothing changed, we wouldn't have anything to discuss.

We have two steady-states: the initial steady-state, before the passive body is added, and the final steady-state, after it is added and the system is allowed to settle.

Do you dispute any of this?

4:54 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-12: "At the beginning of the experiment, the heated element is SPECIFIED, as a condition, to be a CONSTANT temperature in steady-state, before the passive plate is added. Do you dispute this? AFTER the plate is

added, holding that input power constant, the system is again allowed to return to steady-state, which means the temperature is also AT THAT POINT again constant. This is a SPECIFIED CONDITION of the experiment. Do you dispute this? Or you just wasting everybody's time again? I warn you, I will not put up with that kind of crap anymore."

Nobody's disputing that. It's just that the heated plate's CONSTANT temperature before the passive plate is added isn't the same as its CONSTANT temperature afterwards.

It couldn't be, unless its temperature (and thus "radiative power out") is held constant, rather than electrical (or Lonny's horse fart) heating power.

Once again, if you really don't dispute the "kindergarten-level physics" above, you'll be able to calculate the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls. Note that those "kindergarten-level physics" show that your calculation has to include the chamber wall temperature. What electrical heating power do you calculate, Lonny?

4:59 PM

Olaf said...

"Nobody's disputing that. It's just that the heated plate's CONSTANT temperature before the passive plate is added isn't the same as its CONSTANT temperature afterwards."

Then why are you being so obtuse? I haven't claimed ANYWHERE that this is not the case. Why are you wasting everybody's time with nonsensical obvious comments like "but it's not constant"? We already knew that. So what is your purpose for statements of that nature?

"Once again, if you really don't dispute the 'kindergarten-level physics' above, you'll be able to calculate the electrical heating power..."

Yes, I certainly could calculate the electrical heating power if, since this is a thought experiment, we don't have to factor in unknowns like conversion factors. There is no need to add such unnecessary complications.

5:19 PM

Olaf said...

"Lonny, if you actually can't concede this simple point then it looks like you really do dispute these "kindergarten-level physics":"

Just no. You do not get to conflate my statement that thermal imagers do not work in the simplistic manner you describe, with some kind of denial of physics, and expect that to fly.

Just no. Invalid argument.

5:23 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-12: "Yes, I certainly could calculate the electrical heating power if, since this is a thought experiment, we don't have to factor in unknowns like conversion factors. There is no need to add such unnecessary complications."

Once again, if you really don't dispute the "kindergarten-level physics" above, you'll be able to calculate the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls. Note that those "kindergarten-level physics" show that your calculation has to include the chamber wall temperature. What electrical heating power do you calculate, Lonny?

5:23 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-12: "Just no. You do not get to conflate my statement that thermal imagers do not work in the simplistic manner you describe, with some kind of denial of physics, and expect that to fly."

Once again, conservation of energy says:

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

Since radiative power in depends on the chamber wall temperature, this equation says that electrical heating power at steady state depends on the chamber wall temperature.

Lonny, that's all the physics you need to see that uncooled IR detectors don't have to depend on quantum effects to detect cooler objects.

If you really don't dispute the "kindergarten-level physics" above, you'll be able to calculate the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls. Note that those "kindergarten-level physics" show that your calculation has to include the chamber wall temperature. What electrical heating power do you calculate, Lonny?

5:25 PM

Olaf said...

Your own references do not describe anything like the theoretical thermal detector you describe, nor does mine, nor have you offered a real-world example.

If one really exists, let's see it. Or else move on to something else.

5:26 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-12: "Your own references do not describe anything like the theoretical thermal detector you describe, nor does mine, nor have you offered a real-world example. If one really exists, let's see it. Or else move on to something else."

Once again, if you really don't dispute the "kindergarten-level physics" above, you'll be able to calculate the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls. Note that those "kindergarten-level physics" show that your calculation has to include the chamber wall temperature. What electrical heating power do you calculate, Lonny?

5:28 PM

Olaf said...

"Once again, if you really don't dispute the "kindergarten-level physics" above, you'll be able to calculate the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls. Note that those "kindergarten-level physics" show that your calculation has to include the chamber wall temperature. What electrical heating power do you calculate, Lonny?"

I am not obligated to follow your prompting or use your methodology, Bryan.

Since you are asking me such questions, let me ask you something which does not show very clearly in your equations above:

What is the radiative power output of the outside of the passive shell in its final steady-state?

What is the radiative power output of the inside of the passive shell in its final steady-state?

They're your own calculations. I'm just asking you for some values. You don't have to answer if you don't want to.

5:31 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-12: "What is the radiative power output of the outside of the passive shell in its final steady-state? What is the radiative power output of the inside of the passive shell in its final steady-state? They're your own calculations. I'm just asking you for some values. You don't have to answer if you don't want to."

I've already repeatedly agreed that the Stefan-Boltzmann equation determines radiative power out, and already specified the emissivities and areas of the shell, and solved for the temperatures of the outside and inside of the shell.

If you're genuinely curious and are asking this question in good faith (rather than baiting me again for your amusement) and you really can't calculate these values on your own, then I'll try to help.

But quid pro quo first. Let's try to focus on the very first step in solving this problem, before hopping off to another step without solving the very first step.

Lonny Eachus, 2015-04-12: "I am not obligated to follow your prompting or use your methodology, Bryan."

You're not using **any** methodology, Lonny! You're just frantically trying to evade solving this very simple thought experiment now that you can't use your previous approach without blatantly disputing what you call "kindergarten-level physics".

Once again, if you really don't dispute the "kindergarten-level physics" above, you'll be able to calculate the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls. Note that those "kindergarten-level physics" show that your calculation has to include the chamber wall temperature. What electrical heating power do you calculate, Lonny?

5:41 PM

David Appell said...

Lonny wrote:
"Two physical systems are in thermal equilibrium if no heat flows between them when they are connected by a path permeable to heat. Thermal equilibrium obeys the zeroth law of thermodynamics. A system is said to be in thermal equilibrium with itself if the temperature within the system is spatially and temporally uniform."

HEAT, Lonny. Classical heat. That doesn't include radiation transfer.

According to you, the Sun and a bare bones Earth could not be in equilibrium if they weren't at the same temperature. That's absurd.

6:11 PM

David Appell said...

Lonny, you avoided the most relevant question I asked: what happens to the radiation emitted inward by the outer shell?

6:12 PM

David Appell said...

Penzias and Wilson detected the 2.7 K cosmic microwave background with a detector cooled by liquid helium to 4 K.

http://en.wikipedia.org/wiki/Discovery_of_cosmic_microwave_background_radiation#History

6:16 PM

David Appell said...

DS wrote:
"But the temperature of the heated sphere isn't specified to be constant."

Lonny wrote:
"It is at the beginning of the experiment, in the SPECIFIED initial conditions.

We're talking about equilibrium, remember?

6:25 PM

Olaf said...

"We're talking about equilibrium, remember?"

No, we're not. Not at any time.

At ALL times in our little experiment, the central sphere is hotter than the hollow passive sphere, which is hotter than the chamber walls. This condition is maintained throughout the duration of the experiment.

Since the central sphere is hottest, the intermediate sphere somewhere between, and the walls coldest, at all times, the temperature in not at any time "spatially uniform", which is required for the system to be in thermal equilibrium.

This is a direct result of the specified conditions.

7:19 PM

Olaf said...

The temperature of the system IS not at any time spatially uniform.

Damn typos.

7:21 PM

Olaf said...

I wasn't avoiding your question, David. For some reason I didn't see it. I have only a short time here today so I may have inadvertently skipped over it in my hurry.

A gray body with an emissivity does not absorb all incident radiation. It absorbs across all spectra, but Kirchhoff's Law says its absorptivity is about equal to its emissivity.

So, where does it go. The "view factor" here is about 0.998, which for this little side discussion I am happy to just call 1 because rigor is not called for.

So since emissivity is 0.11, at any given time only a small amount of the incident radiation is absorbed.

The rest must be scattered, reflected, or transmitted.

Since these are gray bodies, there is no significant transmission. Therefore most of the incident radiation is scattered or reflected.

So what happens to it then? You tell me.

7:38 PM

Olaf said...

Pardon me, I made an error of omission. I will correct it now.

According to the prior discussion between Bryan and I, we were discussing opaque gray bodies, which is why there is no significant transmission.

I did not mention that as I should have. That was not intentional.

7:51 PM

David Appell said...

Lonny wrote:
"So since emissivity is 0.11, at any given time only a small amount of the incident radiation is absorbed."

And what does that do to the absorber's temperature?

7:55 PM

David Appell said...

"...we were discussing opaque gray bodies."

IMO that just unnecessarily complicates the physics. Blackbodies suffice to make the point I'm trying to make.

7:59 PM

Dumb Scientist said...

By the way, questions with English answers seem to help people who are actually interested in learning physics.

However, some people only seem interested in weaving a maze of words to obfuscate the central point of contention, so questions with equation answers might be more effective. That might be why Prof. Steve Carson finally decided to only accept equation answers.

Lonny Eachus, 2015-04-12: "... Since the central sphere is hottest, the intermediate sphere somewhere between, and the walls coldest, at all times, the temperature in not at any time "spatially uniform", which is required for the system to be in thermal equilibrium. ..."

At 6:03 AM yesterday morning I explained that thermal equilibrium only requires spatially uniform temperatures in a **closed** system. I tried to explain that this is an open system with external energy input, and showed that "equilibrium" is used to describe the condition where there's no change with time in open systems with temperatures that **aren't** spatially uniform. So before Lonny keeps lecturing multiple physicists about basic physics terminology, he should first lecture Dr. Spencer, Prof. Steve Carson, the University of Colorado, etc.

But it's excruciatingly tedious to be wrongly lectured about basic physics terminology, so seven months ago I told Lonny that from now on I'll call the system in "steady state" when its temperatures don't change with time, in the naive hope that we might actually be able to finally take the very first step in this calculation.

It's now seven months later, and Lonny's **still** weaving a maze of words to avoid taking the very first step in this calculation: solving for the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls. Note that this very first step **absolutely is required** because "radiative power out" isn't held constant, but electrical (or Lonny's horse fart) heating power **is** held constant.

David Appell, 2015-04-12: "IMO that just unnecessarily complicates the physics. Blackbodies suffice to make the point I'm trying to make."

I completely agree, which is why I started with a simple blackbody example and repeatedly explained that any gray body equation needs to reduce to the correct black body equation when you plug in emissivity $\varepsilon = 1$.

Anyone who **really** isn't "loathe to use a more complex equation than necessary" should prefer the simpler blackbody case, and should easily be able to calculate the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls. Note that those "kindergarten-level physics" show that your calculation has to include the chamber wall temperature. What electrical heating power do you calculate, Lonny?

5:17 AM

Dumb Scientist said...

Oops, I meant to write: Anyone who **really IS** "loathe to use a more complex equation than necessary"...

6:02 AM

Olaf said...

"At 6:03 AM yesterday morning I explained that thermal equilibrium only requires spatially uniform temperatures in a closed system. I tried to explain that this is an open system with external energy input, and showed that "equilibrium" is used to describe the condition where there's no change with time in open systems with temperatures that aren't spatially uniform. So before Lonny keeps lecturing multiple physicists about basic physics terminology, he should first lecture Dr. Spencer, Prof. Steve Carson, the University of Colorado, etc."

Bryan, would you just knock it off?

I did NOT claim that the system as a whole was not in thermodynamic equilibrium WITH ITS SURROUNDINGS. Doing so would be silly. Once again you seem determined to distort my words. I have to wonder why you do this.

My statement about THERMAL equilibrium was in reference to the relationship between the heated body and the cooled chamber walls.

Do you claim the relationship between those two objects, in the context of this experiment, is what is commonly referred to as THERMAL EQUILIBRIUM? Yes or no.

We agreed in the past (and I think anyone can see) that there is a net radiative heat transfer from the heated body to the cooled walls.

Heat transfer of this nature is considered to be a thermodynamically irreversible process.

So if your answer is yes, then go on to explain how net radiative HEAT TRANSFER occurs between two objects in thermal equilibrium, and what drives it. I'll wait.

I'm just curious how you can consider the individual bodies in the INTERIOR of this system, with its very definite spatially non-uniform temperature distribution, to be in thermal equilibrium.

If David's earlier question was about equilibrium of the system of the whole with its surroundings, then there was a misunderstanding. I'm trying to clear it up here.

In few words: the only claim I have made about equilibrium was in reference to the thermal relationship between the heated plate and the chamber walls, INSIDE the system under discussion. If there is any problem with that, then we need to clear it up now.

10:36 AM

Dumb Scientist said...

Lonny Eachus, 2015-04-13: "My statement about THERMAL equilibrium was in reference to the relationship between the heated body and the cooled chamber walls. Do you claim the relationship between those two objects, in the context of this experiment, is what is commonly referred to as THERMAL EQUILIBRIUM? Yes or no."

Yes, because I'm using this definition of equilibrium: "Class 6- Equilibrium Temperature: Equilibrium means no change with time. ... In equilibrium, we expect ENERGY IN = ENERGY OUT ..."

But once again seven months ago I told Lonny that from now on I'll call the system in "steady state" when its temperatures don't change with time, in the naive hope that we might actually be able to finally take the very first step in this calculation.

It's now seven months later, and Lonny's **still** weaving a maze of words to avoid taking the very first step in this calculation: solving for the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls. Note that this very first step **absolutely is required** because "radiative power out" isn't held constant, but electrical (or Lonny's horse fart) heating power **is** held constant.

Once again, if you really don't dispute the "kindergarten-level physics" above, you'll be able to calculate the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls. Note that those "kindergarten-level physics" show that your calculation has to include the chamber wall temperature. What electrical heating power do you calculate, Lonny?

10:42 AM

Olaf **said...**

As a further comment, to illustrate what I mean:

Your example of a planet in space is not analogous to the circumstances of the interior of the system we are discussing.

A much more fair analogy to the system under discussion is an electrical heater ON the planet, inside a working refrigerator.

Obviously the system as a whole is in equilibrium with its surroundings and the planetary system.

But is the surface of the electrical heater in THERMAL EQUILIBRIUM with the interior walls of the refrigerator?

There is no need to discuss actual numbers in this example, if you are going to be reasonable.

10:49 AM

David Appell **said...**

Lonny, let's stick to the point here.

Lonny wrote:
"So since emissivity is 0.11, at any given time only a small amount of the incident radiation is absorbed."

I'm asking again: And what does that absorption do to the absorber's temperature?

10:53 AM

Dumb Scientist **said...**

Lonny Eachus, 2015-04-13: "Your example of a planet in space is not analogous to the circumstances of the interior of the system we are discussing. ..."

Good grief, Lonny. Spencer's thought experiment is intended to help people begin to understand how the greenhouse effect works. For example, how the greenhouse effect keeps planets in space like Venus hotter than Mercury.

Lonny Eachus, 2015-04-13: "... A much more fair analogy to the system under discussion is an electrical heater ON the planet, inside a working refrigerator. Obviously the system as a whole is in equilibrium with its surroundings and the planetary system. But is the surface of the electrical heater in THERMAL EQUILIBRIUM with the interior walls of the refrigerator?"

Let's use this definition of equilibrium: "Class 6- Equilibrium Temperature: Equilibrium means no change with time. ... In equilibrium, we expect ENERGY IN = ENERGY OUT ..."

If there's no change with time, they're in equilibrium.

So once again seven months ago I told Lonny that from now on I'll call the system in "steady state" when its temperatures don't change with time, in the naive hope that we might actually be able to finally take the very first step in this calculation.

It's now seven months later, and Lonny's **still** weaving a maze of words to avoid taking the very first step in this calculation: solving for the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls. Note that this very first step **absolutely is required** because "radiative power out" isn't held constant, but electrical (or Lonny's horse fart) heating power **is** held constant.

Once again, if you really don't dispute the "kindergarten-level physics" above, you'll be able to calculate the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls. Note that those "kindergarten-level physics" show that your calculation has to include the chamber wall temperature. What electrical heating power do you calculate, Lonny?

10:57 AM

Olaf **said...**

Bryan, again I am going to say just no.

You are again trying to pull a context-shift, and I'm not going to go for it. I will ask one more time:

In this experiment, is the RELATIONSHIP BETWEEN the heated body and the cooled chamber walls INSIDE the system under discussion in a state of what is commonly accepted as THERMAL EQUILIBRIUM?

All I need is a yes or no. I will disregard any other verbiage.

11:03 AM

Dumb Scientist said...

Lonny Eachus, 2015-04-13: "You are again trying to pull a context-shift, and I'm not going to go for it. I will ask one more time: In this experiment, is the RELATIONSHIP BETWEEN the heated body and the cooled chamber walls INSIDE the system under discussion in a state of what is commonly accepted as THERMAL EQUILIBRIUM? All I need is a yes or no. I will disregard any other verbiage."

Once again, yes. Once again, because equilibrium means no change with time.

But once again this is ridiculous, which is why seven months ago I told Lonny that from now on I'll call the system in "steady state" when its temperatures don't change with time, in the naive hope that we might actually be able to finally take the very first step in this calculation.

But not even that stopped Lonny Eachus.

It's now seven months later, and Lonny's **still** weaving a maze of words to avoid taking the very first step in this calculation: solving for the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls. Note that this very first step **absolutely is required** because "radiative power out" isn't held constant, but electrical (or Lonny's horse fart) heating power **is** held constant.

Once again, if you really don't dispute the "kindergarten-level physics" above, you'll be able to calculate the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls. Note that those "kindergarten-level physics" show that your calculation has to include the chamber wall temperature. What electrical heating power do you calculate, Lonny?

11:10 AM

Olaf said...

No, I'm very definitely not trying to play a "maze of words" game. Most people with some knowledge of physics are well aware of what I mean when I say "thermal equilibrium". There is no trickery on MY part here.

If you want to assign it a meaning OTHER THAN the commonly-accepted one which used in most physics textbooks, then YOU are playing word games, not me. AND it means we are not discussing the same things. You are apparently saying the system is in thermodynamic equilibrium, which I do not dispute. I am saying that elements within the system are NOT in a state of what is COMMONLY REFERRED TO as thermal equilibrium.

Thermal equilibrium is not the same thing as overall thermodynamic equilibrium. I'm not denying your definition for certain circumstances. I'm saying it is not relevant to the context I am discussing.

Therefore, since we are not discussing the same things, we have nothing further to discuss.

It's that simple. I'm not going to play YOUR word games anymore, Bryan. I am not willing to have my time further wasted.

11:22 AM

Olaf said...

This has been Bryan's methodology all along: continue shifting the context and playing word games. I've had more than enough of it. I have records of past discussions where he has done this incessantly, making it impossible to get anywhere.

I can only conclude that he does not want to have a serious discussion.

11:25 AM

Dumb Scientist said...

Lonny Eachus, 2015-04-13: "No, I'm very definitely not trying to play a "maze of words" game. Most people with some knowledge of physics are well aware of what I mean when I say "thermal equilibrium". There is no trickery on MY part here. If you want to assign it a meaning OTHER THAN the commonly-accepted one which used in most physics textbooks, then YOU are playing word games, not me. AND it means we are not discussing the same things. You are apparently saying the system is in thermodynamic equilibrium, which I do not dispute. I am saying that elements within the system are NOT in a state of what is COMMONLY REFERRED TO as thermal equilibrium. Thermal equilibrium is not the same thing as overall thermodynamic equilibrium. I'm not denying your definition for certain circumstances. I'm saying it is not relevant to the context I am discussing. Therefore, since we are not discussing the same things, we have nothing further to discuss. It's that simple. I'm not going to play YOUR word games anymore, Bryan. I am not willing to have my time further wasted."

Lonny, we're both using different words to describe the concept of "no change with time". That's why seven months ago I told Lonny that from now on I'll call the system in "steady state" when its temperatures don't change with time, in the naive hope that we might actually be able to finally take the very first step in this calculation.

I did that in response to Lonny's comment:

Jane/Lonny Eachus, 2014-09-03: "... That is a steady state. It is NOT "equilibrium". They are different things. ..."

Lonny, I've repeatedly said that from now on I'll call the system in "steady state" when its temperatures don't change with time.

Lonny Eachus, 2015-04-13: "I can only conclude that he does not want to have a serious discussion."

Even after I've spent seven months repeatedly placating Lonny Eachus by calling the system in "steady state" when its temperatures don't change with time, Lonny Eachus still can't have a serious discussion by taking the very first step: calculating the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls.

11:30 AM

Olaf said...

Bryan, I asked you a simple question about whether the relationship between two objects within the system are in what is commonly known in physics as thermal equilibrium.

You answered yes, when every reference I have consulted -- and I have consulted quite a few -- say NO, this is not a situation that would normally be considered thermal equilibrium.

So I'm not going to dispute your definition, under some circumstances YOU may be discussing. But I am simply discussing a problem using commonly-accepted terms.

As can be clearly seen above, you are not willing to simply discuss the problem at hand, but want to argue about other things in the past and who knows what all else.

I did not come here so you could inflate your own ego about past arguments. I came here -- reluctantly, I might add -- to discuss a straightforward problem.

You have been trying to change contexts, play word games, and discuss other things. Fine. Do that all you like, but you can do it by yourself. I am not interested. You have wasted far too much of my time in the past with those tactics. I have asked you to stop, but you have refused.

The end.

11:41 AM

Dumb Scientist said...

Lonny Eachus, 2015-04-13: "Bryan, I asked you a simple question about whether the relationship between two objects within the system are in what is commonly known in physics as thermal equilibrium. You answered yes, when every reference I have consulted -- and I have consulted quite a few -- say NO, this is not a situation that would normally be considered thermal equilibrium. So I'm not going to dispute your definition, under some circumstances YOU may be discussing. But I am simply discussing a problem using commonly-accepted terms. As can be clearly seen above, you are not willing to simply discuss the problem at hand, but want to argue about other things in the past and who knows what all else. I did not come here so you could inflate your own ego about past arguments. I came here -- reluctantly, I might add -- to discuss a straightforward problem. You have been trying to change contexts, play word games, and discuss other things. Fine. Do that all you like, but you can do it by yourself. I am not interested. You have wasted far too much of my time in the past with those tactics. I have asked you to stop, but you have refused. The end."

Lonny Eachus, it's okay if you want to keep disputing the definition of equilibrium used by Dr. Spencer, Prof. Steve Carson, the University of Colorado, etc.

Once again, seven months ago I told Lonny that from now on I'll call the system in "steady state" when its temperatures don't change with time, in the naive hope that we might actually be able to finally take the very first step in this calculation.

So once again I'm sorry for using that definition of "equilibrium" seven months ago. Once again, I'll only use the Lonny-approved term "steady state" as I have for the past seven months.

I'm very sorry for this miscommunication seven months ago. I take full responsibility.

But after all these months, why can't Lonny Eachus take the very first step in this calculation? Namely, solving for the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls.

11:50 AM

Olaf said...

This is not about "the past seven months", Bryan.

I was invited to come here to discuss a physics problem. It may not be a simple one, but it is straightforward.

You appear to be incapable of simply sticking to the subject and discussing the problem at hand, like an adult. Instead you want to shift the context (your planet example, for instance), argue about past arguments, dispute the meaning of commonly accepted terms, and so on.

This wasn't about you, it wasn't about me. It was about a problem in physics.

I have had exchanges with you in the past about your methods of argument. You play context-shift games, refer to things said in the past out-of-context as though they are relevant to the issue at hand TODAY, change the subject, and move the goalposts. These have all been pointed out to you repeatedly over a period of years.

I did not come here to argue with you about past arguments, or about the commonly-understood meaning of thermal equilibrium. I have NO reason to further waste my time with your methods of argument.

You have been asked repeatedly to stop doing those other things, but you have refused. You appear to be impervious to reason, and incapable of simply discussing THE ISSUE AT HAND like a reasonable adult.

THE END.

12:11 PM

David Appell said...

Lonny, are you really going to avoid my question just when we've gotten to the heart of the matter?

I can't believe it. Wow.

12:24 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-13: "I was invited to come here to discuss a physics problem. It may not be a simple one, but it is straightforward. You appear to be incapable of simply sticking to the subject and discussing the problem at hand, like an adult. Instead you want to shift the context (your planet example, for instance), argue about past arguments, dispute the meaning of commonly accepted terms, and so on. This wasn't about you, it wasn't about me. It was about a problem in physics. I have had exchanges with you in the past about your methods of argument. You play context-shift games, refer to things said in the past out-of-context as though they are relevant to the issue at hand TODAY, change the subject, and move the goalposts. These have all been pointed out to you repeatedly over a period of years. I did not come here to argue with you about past arguments, or about the commonly-understood meaning of thermal equilibrium. I have NO reason to further waste my time with your methods of argument. You have been asked repeatedly to stop doing those other things, but you have refused. You appear to be impervious to reason, and incapable of simply discussing THE ISSUE AT HAND like a reasonable adult. THE END."

That's quite a maze of words to distract people from noticing that you still can't take the very first step: calculating the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls.

12:28 PM

David Appell said...

Because, Lonny, what you have admitted is that you don't believe your own equation.

Earlier you wrote

"My energy conservation equation is this: electrical power in = (epsilon * sigma) * T^4 * area = radiant power out"

Recently you wrote

"...at any given time only a small amount of the incident radiation is absorbed."

which disagrees with your equation.

I'd like to know how you reconcile these two statements.

12:32 PM

David Appell said...

I agree with DS: Lonny is argueing about rhetoric as a way of avoiding discussing the physics.

Lonny, call it "thermal equilibrium" if you want. Call it "equilibriium" or a "steady state." Call it anything at all.

Now then -- about your equation.....

12:51 PM

Olaf said...

No, Bryan.

The reason I didn't "agree" to your elementary statement was because I wanted to point something out to you later. I didn't dispute it or say that I disagree, but I had a point I wanted to make later. Unfortunately, you won't let us get there.

You present your entire set of equations above, based on your assumptions, as a done deal. Which is what I asked for. No problem. But you don't want to let me discuss those assumptions with you.

And you have tried to deny me the right to move forward and do the same thing, presenting my arguments in a logical chain. Instead you have argued over minutiae, and past arguments, and matters that do not apply in this context, and about everything else under the sun (literally) every step of the way, and refuse to have any further discussion about the matter until I accede to your demands. At the same time, you haven't allowed me to do the same in regard to your own solution to the problem.

I repeat: you have done this many times in the past -- and worse -- and I am done with it.

There is a way to go about these things, and that isn't it. I asked you to stop and you won't. What possible motivation could I have to let you waste even more of my life with this kind of one-sided nonsense?

Have a nice day. Or not, as you please. But you will be doing it without me.

THE END!!!!!!!!!!

12:54 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-13: "... you have tried to deny me the right to move forward and do the same thing, presenting my arguments in a logical chain."

Only if "denying you the right to move forward" is defined as repeatedly asking you to take the very first step: calculating the electrical heating power keeping the heat source at 150°F inside 0°F chamber walls.

12:58 PM

David Appell said...

Lonny: I created this post because of you.

Answer my question of 10:53 am.

1:01 PM

Olaf said...

Oh... wait. Not quite, because I didn't bother to read that very last bit you wrote above: "Now then -- about your equation..."

This ILLUSTRATES your method of argument. Argue your own irrelevant points all you want, and only let me go forward when you have no choice but to do so.

Earlier, you said we could not go forward until I acceded to your demand to "agree" about an elementary point. Then you wanted to argue about thermal equilibrium. Only when I say I am through, NOW you want me to go ahead?

And David:

You are welcome to your opinion, but I do not agree.

It is quite possible to reasonably discuss physics problems with other adults that does not require back-and-forth about elementary principles or terminology. And this has not been it.

I offer the length of this page as evidence. WE COULD HAVE BEEN DONE BY NOW.

Good day.

1:04 PM

David Appell said...

Lonny, you're still avoiding the question.

Why?

1:09 PM

Olaf said...

"I created this post because of you."

I did not ask you to do so, and I explained to you clearly why I was reluctant to come here, which you chose not to post.

Bryan and I had this same argument long ago. We could have presented both side of it here long before the weekend was finished.

But every time I have tried to start, I have been met with Bryan's brick walls about irrelevancies, and YOUR demand that I accede to your arguments before I am allowed to present my own.

No.

I came here to have a civil and reasonable discussion. It has not been one. You can believe I am leaving for some other reason all you like, that does not make it so, and frankly I don't much care. I told you my time was limited and it is.

The methods of argument being used are RELEVANT to a logical discussion.

I won't have an argument about radiative heat transfer between objects that are in thermal equilibrium, as that is not the situation being discussed here. You asked me to agree with your elementary principles before, and refused to move forward until I did, but now you won't agree with mine.

As I say: you have demonstrated that you want to have a one-sided argument, and I will therefore no longer participate. I have explained my REASONS, and I think they are reasonable. You may think otherwise, I don't much care.

1:13 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-13: "... This ILLUSTRATES your method of argument. Argue your own irrelevant points all you want, and only let me go forward when you have no choice but to do so. Earlier, you said we could not go forward until I acceded to your demand to "agree" about an elementary point. Then you wanted to argue about thermal equilibrium. Only when I say I am through, NOW you want me to go ahead?"

Lonny, you say you're through in most of the comments you've written for at least the last few years.

And good grief, Lonny Eachus. You're the one who wanted to argue about "thermal equilibrium" rather than just accepting that we were using different words to describe the concept of "no change in time". If you don't believe me, search this page for the naughty word "equilibrium" - the first instance is from Lonny Eachus!

And once again, seven months ago I told Lonny that from now on I'll call the system in "steady state" when its temperatures don't change with time, in the naive hope that we might actually be able to finally take the very first step in this calculation.

That seems like the exact opposite of wanting to argue about thermal equilibrium.

Lonny Eachus, 2015-04-13: "It is quite possible to reasonably discuss physics problems with other adults that does not require back-and-forth about elementary principles or terminology. And this has not been it. I offer the length of this page as evidence. WE COULD HAVE BEEN DONE BY NOW."

Lonny Eachus, 2015-04-13: "... Bryan and I had this same argument long ago. We could have presented both side of it here long before the weekend was finished. ..."

Really? Then prove it. Show everyone how the enclosed plate doesn't warm, without using your previous nonsensical equation which violates what you call "kindergarten-level physics".

Nobody's stopping you. If you're confused and need help with the physics, just ask.

1:15 PM

Olaf said...

Whether the objects under discussion are in thermal equilibrium is RELEVANT to the discussion. It's not JUST a matter of terminology.

Methods of argument in a scientific debate are RELEVANT to the discussion. Without logical argument, a page full of equations doesn't demonstrate much of anything.

If I present my own side of the argument, and use an equation that applies to objects that are not in thermal equilibrium, according to my own physics references, will Bryan continue to make the same argument?

From long past experience, my prediction would be: of course he would.

This has been very time consuming already, and based on evidence on this page, it would get even more time-consuming were we to go forward.

I will not waste my time battling an "opponent" who refuses to stick to civil, logical argument about the subject at hand.

For one simple example: has anyone other than me noticed that he has refused to concede that his point about IR detectors was a gross oversimplification, to the point that a reasonable person might call it incorrect? He asserts otherwise, but his own reference and the one I provided say otherwise. Did he concede this? No... it was "let's just make this assertion but not bother to demonstrate it" and move on.

And recall that this isn't an argument I made, it was one he made.

Etc.

The answer is no.

You don't get to have such a one-sided discussion and call it reasonable, logical argument. It just doesn't work that way. Protest all you like, it changes nothing.

1:52 PM

David Appell said...

Lonny Eachus, you are a fucking coward.

You have completely avoided discussing any physics here at all.

You can't even respond to a very simple question.

Like a child, you've threatened to leave a hundred times.

Every time you came back.

And when you do, you evade, avoid, whine, bitch, complain.

I'm sick of your cowardice.

You do whatever it takes to avoid discussing physics.

Clearly, as DS has shown, you've done this for years.

You're a coward, plain and simple.

1:52 PM

Olaf said...

"Nobody's stopping you. If you're confused and need help with the physics, just ask."

Proof of my point. He just can't help himself.

Good day.

1:53 PM

David Appell said...

Lonny, your childish whining is not allowed here anymore.

Discuss science, or your comments will not be approved.

2:03 PM

David Appell said...

Lonny, I very rarely call people names. But you are unlike anyone I've ever encountered -- you absolutely refuse to discuss science.

You threaten to leave with every comment.

You whine endlessly.

You're a joke. And even STILL you avoid discussing your own equation.

2:09 PM

David Appell said...

Lonny: comment not approved.

Discuss physics. Whining is no longer acceptable.

I have asked you very direct questions. You refuse to answer them.

2:10 PM

David Appell said...

Lonny Eachus: more rhetoric.

You *WILL* discuss science here.

Do you understand?

2:14 PM

Olaf said...

David:

I have answered the questions of yours that I saw. My answers are here on the page. If I missed any, it was inadvertent and I apologize for that, but again, you have given me no reason to remain in this discussion. You have made it all completely moot.

2:18 PM

David Appell said...

Lonny Eachus wrote:
"If you expect me to discuss a problem of radiant heat transfer, without even accepting that two objects under discussion are NOT in a state of what is commonly accepted as thermal equilibrium, you're fucking stupid."

You are whining about labels, Einstein.

Call it whatever the fuck you want.

Show your equations.
Defend your contradictory statements.

2:19 PM

David Appell said...

You did not answer my questions, Lonny.

Don't treat me like I'm stupid. I am not.

2:20 PM

David Appell said...

And Lonny, if you childishly threaten to leave here ONE MORE TIME, you are done.

Is that clear?

2:22 PM

David Appell said...

Lonny, more comments not approved.

I have been VERY specific, several times now.

I am sick of your games.

Answer the question, or else.

2:31 PM

David Appell said...

Lonny Eachus wrote:
"You can't kick me out, you bright person you, because I already quit."

You've threatened to quit with every comment -- a hundred of them by now.

You always come back.

Do you deny this?

2:33 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-13: "Whether the objects under discussion are in thermal equilibrium is RELEVANT to the discussion. It's not JUST a matter of terminology. ..."

Lonny Eachus, 2015-04-13: "... If you expect me to discuss a problem of radiant heat transfer, without even accepting that two objects under discussion are NOT in a state of what is commonly accepted as thermal equilibrium, you're fucking stupid. ... It is RELEVANT to the discussion. ..."

Lonny Eachus, 2015-04-13: "They say it's only a matter of labels. I disagree, saying it's relevant to the solution to the problem."

Whether the objects under discussion are changing with time is relevant. However, it's just a matter of terminology if we refer to the condition of "not changing with time" using the term "equilibrium" or "steady-state".

Lonny Eachus, 2015-04-13: "They're trying to claim that the central object shown in the first picture here are in "thermal equilibrium". One of them at 150F and the other at 0F, vacuum in between. !!!"

I'm claiming that the objects' temperatures aren't changing with time. It's just a matter of labels if we call this "equilibrium" or "steady-state".

But I generously let you choose "steady-state" seven months ago. And yet you're still using this nonsensical excuse to evade solving the very first step of this very simple thought experiment. Why?

Lonny Eachus, 2015-04-13: "If two adjacent gray bodies are in thermal equilibrium, how does a NET radiant heat transfer take place? What is the appropriate equation I should use?"

If two adjacent gray bodies aren't changing with time, then draw a boundary and set power in = power out.

Lonny Eachus, 2015-04-13: "... has anyone other than me noticed that he has refused to concede that his point about IR detectors was a gross oversimplification, to the point that a reasonable person might call it incorrect? He asserts otherwise, but his own reference and the one I provided say otherwise. Did he concede this? No... it was "let's just make this assertion but not bother to demonstrate it" and move on. ..."

Once again, conservation of energy says:

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

Since radiative power in depends on the chamber wall temperature, this equation says that electrical heating power at steady state depends on the chamber wall temperature.

Once again Lonny Eachus, that's all the "kindergarten-level physics" you need to see that uncooled IR detectors don't have to depend on quantum effects to detect cooler objects. Unless you really **are** disputing the fact that electrical heating power at steady state depends on the chamber wall temperature, and are just baiting me again for your amusement?

Lonny Eachus, 2015-04-13: "FINAL response. They may be physicists but they don't know logical argument when they see it. These two bozos wanted to set me up. (I *DO* have a reply to their physics problem, by the way.)"

Really? If you're worried about being "censored" by the other "bozo" just post your physics calculations as a reply to Jane Q. Public here.

That way, anyone who reads this page will be able to follow that link and see if Jane/Lonny Eachus was actually able to show that the enclosed plate doesn't warm, or if he wasn't even able to do that on a website where his comments wouldn't be deleted.

2:56 PM

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Quark Soup by David Appell

WEDNESDAY, APRIL 08, 2015

Discussion of How Global Warming Works

This is a post whose comments will be a discussion of things I'm discussing with someone on Twitter (to take it off Twitter and its character limitations).

Posted by David Appell at 4/08/2015 09:04:00 PM

208 comments:

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David Appell said...

I have to admit, I am somewhat stunned that Lonny Eachus would run away just at the point where the discussion had finally zeroed in on the essential points.

He refused to address them -- because, it's clear, the answers were obvious, and obviously different than his claims.

This is a display of raw, naked intellectual dishonesty, the likes of which I have never seen before. And I've seen a lot.

A hundred comments, all to evade the essential questions. Wow. DS, I don't know how you do it, how you remain calm with him. I really don't.

9:05 PM

Dumb Scientist said...

David Appell, 2015-04-13: "I have to admit, I am somewhat stunned that Lonny Eachus would run away just at the point where the discussion had finally zeroed in on the essential points. ..."

Are you sure you don't have that backwards?

Lonny Eachus, 2015-03-27: "This is MY experience with those who don't want to admit that their greenhouse gas theories are wrong: They argue until they start losing, then try misdirection with guff like "scientists can be wrong". Then if you don't stop, they run away."

Lonny Eachus, 2015-04-08: "Warmists like to argue until they're stumped, then call names and stalk off. I've seen it 1000 times."

Holy psychological projection, Batman!

David Appell, 2015-04-13: "... A hundred comments, all to evade the essential questions. Wow. DS, I don't know how you do it, how you remain calm with him. I really don't."

Heh. That's what ATTP said after I linked to one of my exchanges at WUWT.

If I were to give a more serious answer, it might be that I try to convince myself that Lonny Eachus et al. are just victims of Sky Dragon Slayer brainwashing and a Sauron-class Morton's demon, rather than foul-mouthed pathological liars who have betrayed humanity.

6:37 AM

Olaf said...

Bryan, you aren't going to get it both ways.

I told David from the beginning that I didn't want to argue with you about SCIENCE, because you don't argue fairly. And you don't.

You want to use ad-hominem (as you just did above, for about the 1000th time in my experience), you play nasty distorted out-of-context games, etc.

I agreed to come here and discuss this problem, very reluctantly, ON THE CONDITION that you don't do that kind of crap.

The way you argue makes a difference. Not to the actual science, but to whether anybody really has any motivation to argue with you. YOU wanted this, not me.

And I have no desire to argue over what took place in the past. You wanted to argue this now, you argue about it now, not about what was said months to years ago... especially since (as my archive of our discussions clearly shows) you have had a strong tendency to misrepresent those statements.

Now: in the beginning, I did make a mistake. But you showed that your equation was indeed used in situations other than thermal equilibrium, so I came back and conceded that if I wanted to be reasonable, I had to accept it.

Rule #1: You can never ask too many questions.

ABOUT ME

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View my complete profile

GOOD LINKS:

- Annie Jia (The Science Journalism Experiments)
- Climate Data Sources
- Dark Roasted Blend

But then you started in: demanding that I "accept" your principles each step of the way. On and on, without relent. That's not the way adults argue about science. The way it works is: you present your arguments, then shut the hell up and let me present mine.

Both of you refused to do that. When I protested your methods, David censored me again. Which I intend to show the world at a future time. Because I told you I was going to write this all up, and I am. When I get around to it.

Then David continued to argue with me about whether the INTERIOR of the system in question is in THERMAL equilibrium, when clearly it is not, by any definition from any reference I have ever seen.

It is RELEVANT to the discussion, and the problem at hand, whether those objects are in local thermal equilibrium. Period.

Now, I don't give much of a damn at this point whether YOU now claim otherwise, when clearly further up the page you had agreed with him. As far as I am concerned, the RELEVANT point is that you don't play by the rules of logical debate, and what rules he may have, were not applied equally.

I repeat: I went there on certain conditions. Whether David agreed with them or not, they were MY conditions, not his, and they were violated. When I protested, I was censored. When I decided to play the same game you were playing, and asked people to agree on INITIAL CONDITIONS, you didn't get it right. No, those two objects are not in local thermal equilibrium, and your planet example was yet another of your context-shifts, intended to support your argument that they were. Just as your oversimplification of how IR imagers work was a gross oversimplification to the point of being just plain incorrect... yet you were using it (invalidly) to support your argument. When I protested, I was censored again, under the excuse that I wasn't arguing "the science". Well, if that wasn't arguing science I don't know what was.

The problem is that you just don't know how to make valid logical arguments in an adult discussion, and because you wanted to play one-sided rules + censorship.

End of story. I won't argue with you under these circumstances. And as I have told you many times in the past, I don't intend to argue with YOU again, at any time, because you don't know how. Stop whining, and pick up a book on debate.

I don't expect David to post this, because he'll say it isn't about "the science".

10:08 AM

Dumb Scientist said...

Lonny Eachus, 2015-04-14: "But then you started in: demanding that I "accept" your principles each step of the way. On and on, without relent. That's not the way adults argue about science. The way it works is: you present your arguments, then shut the hell up and let me present mine."

Actually, I **asked** if we could agree on the most basic equation, because once again a shared understanding requires building a strong foundation first. It's pointless to argue about more complicated topics if we can't even agree on the basics.

In my experience, that's the way adults argue about science. But once again it's astonishing that Lonny Eachus doesn't seem to grasp the irony of him lecturing scientists about how scientists argue.

Does Lonny Eachus even **have** have an argument showing the enclosed plate doesn't warm, **without** using his previous nonsensical equation which violates what he calls "kindergarten-level physics", and **without** once again wrongly claiming that "radiative power out" is held constant rather than electrical (or Jane's cow fart or Lonny's horse fart, etc.) heating power?

If so, he can either post it here or here where it won't be "censored".

If not, Lonny Eachus should feel free to continue endlessly whining on Twitter.

10:23 AM

David Appell said...

Lonny wrote:
"It is RELEVANT to the discussion, and the problem at hand, whether those objects are in local thermal equilibrium. Period."

We've already said, you can call it whatever you want. So that's the end of that issue.

Now address the fact that your equation does not, by our own admission, conserve energy.

"My energy conservation equation is this: electrical power in = (epsilon * sigma) * T^4 * area = radiant power out""

10:32 PM

Olaf said...

"We've already said, you can call it whatever you want. So that's the end of that issue."

A bit late, don't you think? I do.

From Dr. Stephen O. Nelson:

"In physics, we call "thermodynamics" something else. We call it "statistical mechanics." Meaning macroscopic and predictable based on statistics. Before you read further, please just consider this notion: "equilibrium" is *defined* in thermodynamics as a state where there is no net flow. Trying to prove that there is a net flow is just trying to prove non-equilibrium. There's no reason to try and say that there are counterexamples. That's like trying to say that a dog is really a cat. The very word "equilibrium" means that all the flows are equal in all parts of the system, in and out. If you find a counterexample that exists, then by definition the system is NOT IN EQUILIBRIUM. So if you find a counterexample, then you've found a system that is not in thermal equlibrium. Done."

- Early Papers on CO2 & Climate
- Hotwhopper
- John Fleck
- Justin Berk
- RealClimate
- Skeptical Science
- Stoat
- The Green Grok
- Three Rivers Review
- Variable Variability

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There is net flow. You tried to call a dog a cat. After what ELSE had gone before, that was enough for me. And I shall not argue with Bryan anymore. Period. I did warn you about that.

You don't get it. I told you I quit. You even tried to berate me for coming back here after I told you I quit, and you continued to ask me questions. Now you're still doing it, and I fully expect you to complain that I *DID* come back here again. You're trying to have it both ways.

So get it. I quit. Based on my past experiences with Bryan Killett, and his demonstrated refusal to change his ways, I will not participate. I told you in the beginning, David, that was probably the way we should have gone about this in the first place: not at all.

I told you in advance what I would not put up with. You did it anyway.

You do understand the end, don't you?

11:40 PM

Dumb Scientist said...

Lonny Eachus, 2015-04-15: "There is net flow. You tried to call a dog a cat. ..."

Lonny Eachus already tweeted that quote and said: "In the system I showed there IS net heat transfer. It is not in local thermal equilibrium. The point was important."

Once again, notice that the quote you copied isn't restricted to **heat** flow. That point is important. Conservation of energy applies to **all** energy which crosses a boundary, even if it crosses that boundary in the form of electricity instead of heat.

Conservation of energy means that if you draw a boundary around some system (like the heated plate), power going in minus power going out of the boundary equals the rate at which energy inside that boundary changes. If nothing inside the boundary is changing, that rate is zero so power in = power out.

If power in = power out, physicists say there's "no net flow".

So Lonny's link is actually just repeating the same basic concept that I am: if there's no change with time, conservation of energy says that power in = power out. **ALL** power. **Not** just heat, because **any** form of energy has to be included in the energy conservation equation.

That's why if nothing is changing with time, electrical heating power depends on the cooler chamber wall temperature:

electrical heating power + radiative power in from the chamber walls = radiative power out from the heat source

Once again, what matters is that the objects' temperatures aren't changing with time. It's just a matter of labels if we call this "equilibrium" or "steady-state".

But I generously let you choose "steady-state" seven months ago. And yet you're still using this nonsensical excuse to evade solving the very first step of this very simple thought experiment. Why?

Lonny Eachus, 2015-04-13: "FINAL response. They may be physicists but they don't know logical argument when they see it. These two bozos wanted to set me up. (I *DO* have a reply to their physics problem, by the way.)"

Really? Then prove it. Show everyone how the enclosed plate doesn't warm, **without** using your previous nonsensical equation which violates what you call "kindergarten-level physics", and **without** once again wrongly claiming that "radiative power out" is held constant rather than electrical (or Jane's cow fart or Lonny's horse fart, etc.) heating power.

Lonny Eachus, 2015-04-15: "... You do understand the end, don't you?"

Sure, you're running away / stalking off because you're stumped.

If you're worried about being "censored" by the other "bozo" just post your physics calculations as a reply to Jane Q. Public here.

That way, anyone who reads this page will be able to follow that link and see if Jane/Lonny Eachus was actually able to show that the enclosed plate doesn't warm, or if he just ran away because he wasn't even able to do that on a website where his comments wouldn't be deleted.

4:14 AM

David Appell said...

Lonny Eachus wrote:
"A bit late, don't you think? I do."

No -- it was said a long time ago. You pretended othewise to avoid discussing the science, and you're doing it still.

"You do understand the end, don't you?"

Ever heard of the boy who cried wolf?

8:00 AM

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