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159 More Prefs

-

What will happen to their physical condition (Score:3)

by Meshach (578918) Alter Relationship
If they are just sleeping (or in whatever state they are in) will not their muscles deteriorate? After having no nourishment for several weeks most people will waste away to nothing.
--
"Maybe this world is another planet's hell"
Aldous Huxley

Re: (Score:4, Informative)

by Anonymous Coward

Well, the article has the following text pretty much at the top:

"During interplanetary transit, the crew would receive low-level electrical impulses to key muscle groups to prevent muscular atrophy."

Re: (Score:4, Informative)

by DittoBox (978894) Alter Relationship

This won't help with bone density loss, lowered heart strength, or a number of other issues.

--
Good. Cheap. Fast. Pick Two.

Re: (Score:3)

by gcnaddict (841664) Alter Relationship
You'll lose most of that on Mars anyway. Reduced gravity :)

Re: (Score:2)

by LifesABeach (234436) Friend of a Friend
Maybe we should try for the Moon? It's a lot closer, and it would give us time to work out these types of issues?

-
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›

Re:What will happen to their physical condition (**Score:2**)

by Jane Q. Public (1010737) Friend of a Friend on 2014-10-03 14:02 (#48058829)

Maybe we should try for the Moon? It's a lot closer, and it would give us time to work out these types of issues?

I'm with you on that.

Seems to me, the "cold sleep" option mainly solves the problems of crew space, resources, and radiation. Those are not small things.

A long-term space expedition must have room to move and exercise. That's a lot of size and mass. Then it needs food to promote exercise and waking function, and waste disposal to match. And THEN all that has to be wrapped in effective radiation shielding, which adds a lot more mass.

Eliminate the exercise, confine the crew to a small space, feed intravenously, and shield only that small part is FAR more efficient.

On the other hand, as many have pointed out, it comes with some serious cost as well.

I think landing on Mars would be a great accomplishment, but establishing a permanent moon base would be a vastly greater accomplishment.

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Re:What will happen to their physical condition (**Score:2**)

by angel'o'sphere (80593) Alter Relationship on 2014-10-03 15:27 (#48059379) Homepage Journal

Why should any 'sleep option' solve any radiation issue?
WTF you always proclaim you had a clue about physics, another post of yours where it is clear: you have not!
Ah, you try to talk about shielding, face palm ... the volume you shield is irrelevant, the main hazard is the sun, which is 'behind' you. Actually, reliable shielding is impossible anyway. We are not talking about a nuclear reactor where one yard of lead or ten yards of water are a nice shielding.

Radiation in this case are atomic particles at relativistic speeds.
Perhaps they get stopped by a 'shield' to fry you with 'Bremsstrahlung' instead.
WTF, many problems are 'inherent' problems, you can not get 'around' of them.
Perhaps you can find a compromise, sure. But I for my part rather stay awake and die consciousness in case of a solar storm than do the greatest endeavor of mankind in my sleep!

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Re:What will happen to their physical condition (Score:2)

by khayman80 (824400) on 2014-10-03 16:43 (#48059921)
Homepage Journal
Reliable shielding isn't impossible. Shielding of 4.41 tons/m^2 is sufficient. Putting the crew in hibernation does reduce shielding because otherwise the entire back side of the spacecraft (at least) has to be covered with 4.41 tons/m^2 of shielding. In hibernation, the crew could be closely packed and aligned with their feet towards the sun, reducing the required shielding area and mass.
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Re:What will happen to their physical condition (Score:2)

by angel'o'sphere (80593) Alter Relationship on 2014-10-03 19:02 (#48060637) Homepage Journal

Hypothetically ...
In real live that is irrelevant. Regardless if your 4.41 ton/m^2 is right (sounds a retarded measurement, tons of what? Lead? Water?) The number you quote does not show up in the link :D

I never said shielding is impossible, but the question if one is hibernated for 9month versus awake for 6month versus in danger of "radiation" for either 6 or 9 or 12 months ... has not much to do with shielding.

As I said before: I had no problem being awake on such a journey, there are plenty of books to read while traveling.

I never would do that hibernated. Sounds like the "death by injection" penalty ... except you "believe" you wake up later.

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- **Re:What will happen to their physical condition (Score:2)**

  by khayman80 (824400) on 2014-10-03 19:26 (#48060773) Homepage Journal
  NASA found that 441 grams/cm^2 of silicon dioxide (Moon dust) would be sufficient shielding, which equals 4.41 tons/m^2. Hibernation dangers and personal preference regarding books may vary, of course.
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- **Re:What will happen to their physical condition (Score:2)**

  by angel'o'sphere (80593) Alter Relationship on 2014-10-03 21:18 (#48061099) Homepage Journal

  Erm, your numbers still make no sense, as the real question is only the thickness.
  In other words: the bigger the ship in diameter the more shielding you obviously need, but the thickness over that area would be rhe same.
  So, how thick should such a ahield be? 2m? 5m?

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Re:What will happen to their physical condition (Score:2)

by khayman80 (824400) on 2014-10-03 21:40 (#48061151) Homepage Journal

A hibernating crew could be closely packed and aligned with their feet towards the sun, reducing the required shielding area and mass at constant thickness. That's because only the hibernation chamber would need to be shielded, not the entire ship.

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Re:What will happen to their physical condition (Score:2)

by angel'o'sphere (80593) Alter Relationship on 2014-10-03 21:53 (#48061179) Homepage Journal

Yes, but we still don't know how big the shielding would be :)
Hence we can not judge if it makes any sense (shielding wise, and based on shielding, fuel wise)
And actually, you very likely wont align them with the feet to the sun. That makes no sense. If one gets hit by a particle into the foot, it will likely go straight through the whole body to the brain. It is much better to put the people perpendicular to the sun. If one gets hit somewhere the particle just goes out of the other side with much less damage. Unless you only have a single person in the craft the area with shielding would be just the same.

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Re:What will happen to their physical condition (Score:2)

by khayman80 (824400) on 2014-10-03 22:04

(#48061189) Homepage Journal
If the main hazard is the sun, that requires thicker shielding on the sunward side. Minimum shielding mass would then be obtained by putting 4.41 tons/m^2 on the sunward side, which given moon dust density equals a ~2.4 meter thick shield on the sunward side. If the people are perpendicular to the sun, that shield is heavier. The people are awake and moving around, that shield is **much** heavier.
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Re:What will happen to their physical condition (Score:2)

by Half-pint HAL (718102) Friend of a Friend on 2014-10-04 7:00 (#48062445)

A hibernating crew could be closely packed and aligned with their feet towards the sun,

If you do that, you preclude the use of rotation as a simulation of gravity to deal with bone deterioration.

--
Got them moderator blues I blieve I walk out the do', With these mod-points I been gettin', I 'most never post no mo'
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Re:What will happen to their physical condition (Score:2)

by khayman80 (824400) on 2014-10-04 10:37 (#48063605) Homepage Journal

Centrifuges need to rotate no faster than 1 rpm to avoid inducing motion sickness. That's for long-term colonies, so maybe 2 or 3 rpm would be acceptable for astronauts selected for their resistance to motion sickness. Maybe even faster if they're hibernating the whole way. But regardless, the centrifuge would still have to be quite large.

If the centrifuge is inside the shielding, that makes the shield enormously bigger and heavier. Alternatively, only the hibernation/living chamber at the end of the centrifuge could be shielded. But that requires that the shielding mass be attached to the centrifuge, which vastly increases its required tensile strength. That's why the NASA study placed the colony's centrifuge inside a separate shield: if the shield rotates with the centrifuge then the centrifuge would have to be built out of carbon nanotubes. If the shield is separate then the centrifuge can be built out of aluminum.

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Re:What will happen to their physical condition (Score:2)

by Jane Q. Public (1010737) Friend of a Friend on 2014-10-03 22:45 (#48061279)

As I implied elsewhere, when you minimize solar radiation you are eliminating most of the energetic radiation/particles, but by no means all. We already know this from Spacelab and ISS experience. If you ignore extrasolar energetic particles you're just being stupid. Unless you plan a 1-way trip. Which has been suggested.

Certainly most of the shielding should be between the sun and the crew. But it's not all the shielding necessary. And though the "other" shielding need not be as heavy, its area is much larger so it still contributes a lot to the overall mass of the vehicle.

Based on other arguments with khayman80, to be honest I would not trust him to build a bridge over a creek, much less a spaceship. That's just the truth.

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- **Re:What will happen to their physical condition (Score:2)**

  by khayman80 (824400) on 2014-10-03 22:53 (#48061299) Homepage Journal

  I never said we should ignore extrasolar particles. I was just showing that even using angel'o'sphere's assumption that the sun is the main hazard, the shielding mass decreases for a hibernating crew. In other words, **I was defending you, Jane**. Even though I can't be trusted to build a bridge over a creek.

  But since you brought up those other arguments...

  > There is no reason to "guess" at my reasoning. I spelled it out quite clearly when we had our "argument" (which you lost). You do realize this is all going to be published, right? I warned you not just once or twice, but many times now. Every time you pull this kind of BS will be just another instance of widespread public knowledge of your dishonesty. ***[Jane Q. Public, 2014-10-03]***

  I have to guess at your reasoning because what you've said doesn't make any sense.

  >> If radiation enters the boundary and goes right back out, we need to account for it entering and exiting. That's why there are separate terms for "power in" and "power out".

  > Just no. If radiation goes in and comes right back out, we do not need to account for it, because then the NET amount of that particular radiation crossing your boundary is ZERO. A = A. You do know how to add and subtract,

> right? You know what a zero is, right? [Jane Q. Public, 2014-09-24]

I have to guess at what Jane meant by this, because it's not in equation form. In physics, statements in equation form are easier to analyze.

Draw a boundary around the (gray or black body) heat source:
Jane's power in = electrical heating power + radiative power in from chamber walls
Jane's power out = radiative power out from source + radiative power from chamber walls, re-emitted back out

At steady state, Jane's power in = Jane's power out:

electrical heating power + radiative power in from chamber walls = radiative power out from source + radiative power from chamber walls, re-emitted back out (Jane's equation?)

Jane, is that your equation for required electrical heating power? By "A = A", are you saying "radiative power in from the chamber walls" = "radiative power from chamber walls, re-emitted back out"?

> I am not going to get drawn into an argument that you have already lost. I repeat that the equation you show is for HEAT TRANSFER, not "radiative power out". You are just plain wrong about that and any heat transfer textbook will you so. ... [Jane Q. Public, 2014-10-03]

Once again, to calculate "electrical heating power" you need to use a heat transfer equation which accounts for power in and power out. That's because power in = power out through any boundary where nothing inside is changing. Once again, the equation Jane's using is only valid for "radiative power out" which is completely different than "electrical heating power". That's why I'm starting with the principle of "conservation of energy" and trying to understand what Jane's saying, in equation form.

Jane, if you don't agree with the "power in" and "power out" that I've tried to glean from your rants, just fill in the following blanks like I did. It'll be much faster than accusing me of dishonesty, fraud, and libel.

Jane's power in = ?
Jane's power out = ?

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Re:What will happen to their physical condition (Score:1)

by Jane Q. Public (1010737) Friend of a Friend on 2014-10-03 23:07 (#48061325)
We've been over this before, and you already know the answers I've given you. Stop being a grandstanding asshole. I don't have to keep repeating my answers every time you demand them. That's called ASSHOLE behavior, asshole.

You have already seen my calculations and my answers to all these questions. By bringing them up and demanding them AGAIN in a different forum, you are advertising your own dishonesty.

It didn't work. Don't worry, as I promised this will all be published when I find the time.
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Jane/Lonny Eachus goes Sky Dragon Slayer (Score:2)

by khayman80 (824400) on 2014-10-03 23:11 (#48061333) Homepage Journal

> We've been over this before, and you already know the answers I've

given you. Stop being a grandstanding asshole. I don't have to keep repeating my answers every time you demand them. That's called ASSHOLE behavior, asshole. You have already seen my calculations and my answers to all these questions. By bringing them up and demanding them AGAIN in a different forum, you are advertising your own dishonesty. It didn't work. Don't worry, as I promised this will all be published when I find the time. ***[Jane Q. Public, 2014-10-03]***

Jane, the answers you've given don't make any sense. That's why I'm asking you for a very simple equation describing the required electrical heating power. Again, filling in the following blanks would be be much faster than repeatedly calling me an asshole.

Jane's power in = ?
Jane's power out = ?

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Re:Jane/Lonny Eachus goes Sky Dragon Slayer (**Score:1**)

by Jane Q. Public (1010737) Friend of a Friend on 2014-10-04 8:59 (#48063075)

Jane, the answers you've given don't make any sense.

They don't make any sense **to you**. This much is obvious.

That's why I'm asking you for a very simple equation describing the required electrical heating power.

I repeat: I have already answered these questions several times. You have no legitimate purpose in asking them again somewhere else.

And yes, repeating your questions here after they have already been answered is ill behavior on your part.

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Jane/Lonny Eachus goes Sky Dragon Slayer (Score:2)

by khayman80 (824400) on 2014-10-04 10:21 (#48063549) Homepage Journal

> I repeat: I have already answered these questions several times. You have no legitimate purpose in asking them again somewhere else. And yes, repeating your questions here after they have already been answered is ill behavior on your part. ***[Jane Q. Public, 2014-10-04]***

Jane, you're still wrongly insisting that electrical heating power per square meter = (e*s)*T1^4. Once again, Jane's equation violates conservation of energy. That's why I'm trying to understand why you keep insisting it's correct. At first I thought you agreed that power in = power out, but that we only disagreed about which terms to include:

> > If radiation enters the boundary and goes right back out, we need to account for it entering and exiting. That's why there are separate terms for "power in" and "power out".
>
> Just no. If radiation goes in and comes right back out, we do not need to account for it, because then the NET amount of that particular radiation crossing your boundary is ZERO. A = A. You do

> know how to add and subtract, right? You know what a zero is, right? ***[Jane Q. Public, 2014-09-24]***

Jane's statement originally made me think that Jane is reasoning like this:

Draw a boundary around the (gray or black body) heat source:
Jane's power in = electrical heating power + radiative power in from chamber walls
Jane's power out = radiative power out from source + radiative power from chamber walls, re-emitted back out

At steady state, Jane's power in = Jane's power out:

electrical heating power + radiative power in from chamber walls = radiative power out from source + radiative power from chamber walls, re-emitted back out (Jane's equation?)

Jane, is that your equation for required electrical heating power? By "A = A", are you saying "radiative power in from the chamber walls" = "radiative power from chamber walls, re-emitted back out"?

But now it seems like our disagreement is even more fundamental:

> I am not going to get drawn into an argument that you have already lost. I repeat that the equation you show is for HEAT TRANSFER, not "radiative power out". You are just plain wrong about that and any heat transfer textbook will you so. ... ***[Jane Q. Public, 2014-10-03]***

This objection is completely different than Jane's "A = A" objection above, which at least seemed to acknowledge that we should start with the principle of conservation of energy, where power in = power out. But now Jane even seems to dispute that starting point.

I'm starting to suspect that Jane opened a textbook and found "radiative power out per square meter = (e*s)*T^4" and simply assumed that "radiative power out" is just a fancy way of saying "electrical heating power". Is that how Jane "derived" his incorrect equation that electrical heating power per square meter = (e*s)*T1^4?

If so, that's kind of a boring mistake because "radiative power out" **isn't** just a fancy way of saying "electrical heating power". They're completely different. To find electrical heating power, Jane needs to use conservation of energy, where power in = power out. That results in a heat transfer equation, not just an equation for "radiative power out".

Jane, if you don't agree with the "power in" and "power out" that I've tried to glean from your rants, just fill in the following blanks like I did. It'll be much faster than accusing me of ill behavior.

Jane's power in = ?
Jane's power out = ?

Or, explain why we shouldn't start with the principle of conservation of energy which results in a heat transfer equation. Or, (more likely) just keep calling me a fraudulent dishonest lying dumbshit fucking moron idiot asshole. But note that the last option says more about Jane than me.

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Re:Jane/Lonny Eachus goes Sky Dragon Slayer (Score:2)

by Jane Q. Public (1010737) Friend of a Friend on 2014-10-05 8:38 (#48068203)

Draw a boundary around the (gray or black body) heat source:
Jane's power in = electrical heating power + radiative power in from chamber walls
Jane's power out = radiative power out from source + radiative power from chamber walls,

re-emitted back out

Just no. That is not even remotely what I meant, and I explained this to you clearly at least several times already. I have no reason to continue to re-explain it just because you keep asking.

Instead I'm going to repeat something else I have stated several times: pick up a textbook on heat transfer, and **see what the accepted, textbook, "consensus" science says about it.** Hint: they don't agree with you.

I don't appreciate this constant harassment over something that has been explained to you clearly many times over. If you truly still don't understand it, that is sad but it is also not my problem. A textbook might help.

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Jane/Lonny Eachus goes Sky Dragon Slayer (Score:2)

by khayman80 (824400) on 2014-10-05 10:10 (#48068699) Homepage Journal

> Just no. That is not even remotely what I meant, and I explained this to you clearly at least several times already. I have no reason to continue to re-explain it just because you keep asking. Instead I'm going to repeat something else I have stated several times: pick up a textbook on heat transfer, and **see what the accepted, textbook, "consensus" science says about it.** Hint: they don't agree with you. ***[Jane Q. Public, 2014-10-05]***

Jane, mainstream physics is based on conservation of energy. That means power in = power out through any boundary where nothing inside is changing. If your textbook doesn't agree with that principle, it's either wrong or you're misinterpreting what it says. For instance:

> I will do you a favor here, and say: don't bother to go calculating the energy, either. The problem is that an analysis of this kind, **based on** the assumption that power-in = power-out, is doomed to fail except in coincidental cases. Even conservation of energy can give very misleading results. The black body example I gave shows why your "energy conservation just inside the surface" won't work. Aside from just "view factor" and a few other things, a certain amount of the power in (often a very significant amount) just ends up going right back out, but you often don't see that in the formulas. Quote from one of my references, "Fundamentals of Heat and Mass Transfer", by Inropera, et al., 6th edition, 2006, p13. I have to type this in by hand from the book so any typographical errors are mine. Emphasized words have been capitalized.
>
>> **Relationship to Thermodynamics**
>>
>> At this point it is appropriate to note the fundamental differences between heat transfer and thermodynamics. Although thermodynamics is concerned with the heat interaction and the vital role it plays in the first and second laws, it considers neither the mechanisms that profide for heat exchange nor the methods that exist for

computing the RATE of heat exchange. Thermodynamics is concerned with EQUILIBRIUM states of matter, where an equilibrium state necessarily precludes the existence of a temperature gradient. Although thermodynamics may be used to determine the amount of energy required in the form of heat to pass from one equilibrium state to another, it does not acknowledge that HEAT TRANSFER IS INHERENTLY A NONEQUILIBRIUM PROCESS. For heat transfer to occur, there must be a temperature gradient and, hence, thermodynamic nonequilibrium. The discipline of heat transfer therefore seeks to do what thermodynamics is inherently unable to do, namely, to quantify the RATE at which heat transfer occurs in terms of the degree of thermal nonequilibrium. This is done via the rate equations for the three modes ...

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. ***[Jane Q. Public, 2014-09-07]***

No Jane, you've misinterpreted your textbook. Energy is **always** conserved, so power in = power out through any boundary where nothing inside is changing. This isn't a "very rare exception". It's a fundamental law called "conservation of energy". Does Jane seriously think his textbook says that using a fundamental law like "conservation of energy" is "doomed to fail"?

Again, it really sounds like Jane opened a textbook and found "radiative power out per square meter = (e*s)*T^4" and simply assumed that "radiative power out" is just a fancy way of saying "electrical heating power". Is that how Jane "derived" his incorrect equation that electrical heating power per square meter = (e*s)*T1^4?

If so, that's kind of a boring mistake because "radiative power out" **isn't** just a fancy way of saying "electrical heating power". They're completely different. To find electrical heating power, Jane needs to use conservation of energy, where power in = power out. That results in a heat transfer equation, not just an equation for "radiative power out".

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Re:Jane/Lonny Eachus goes Sky Dragon Slayer (Score:2)

by Jane Q. Public (1010737) Friend of a Friend on 2014-10-05 12:29 (#48069279)

Jane, mainstream physics is based on conservation of energy. That means power in = power out through any boundary where nothing inside is changing. If your textbook doesn't agree with that principle, it's either wrong or you're misinterpreting what it says. For instance:

I know how this works. Stop trying to be insulting. I'm not the one who got it wrong. YOUR answer (checked 3 different ways) violated conservation of energy. Not mine. Again: I checked both my work and yours. Your "answer" didn't even check out using your own heat transfer equations.

No Jane, you've misinterpreted your textbook. Energy is always conserved, so power in = power out through any boundary where nothing inside is changing. This isn't a "very rare exception". It's a fundamental law called "conservation of energy". Does Jane seriously think his textbook says that using a fundamental law like "conservation of energy" is "doomed to fail"?

I know energy is always conserved, you insufferable ass. I have already proved that my answer conserved energy and yours did not. Your constant blathering about it elsewhere (like here) does not change that.

Is that how Jane "derived" his incorrect equation that electrical heating power per square meter = (e*s)*T1^4?

Your insistence on "electrical heating power" is a red herring. Energy is energy. Your misguided attempt to include the power used to cool the chamber walls does not change that. Spencer stipulated "electrical power to the heat source". It is neither necessary nor called for to calculate the power used to cool the chamber walls in order to find the temperatures of the other bodies.

(e*s)*T1^4 is often called the "Stefan-Boltzmann relation", which is **derived from** the Stefan-Botlzmann radiation law, and which describes the relationship between thermodynamic temperature and radiative power output **of a single gray body**. I repeat: you can find this equation in heat transfer textbooks and I also showed you where it is in Wikipedia. Stop pretending ignorance about things I already explained to you clearly several times. I can only conclude that you're doing this in order to harass.

If so, that's kind of a boring mistake because "radiative power out" isn't just a fancy way of saying "electrical heating power". They're completely different. To find electrical heating power, Jane needs to use conservation of energy, where power in = power out. That results in a heat transfer equation, not just an equation for "radiative power out".

NO, it does NOT result in a heat transfer equation. There is no need to account for other, cooler bodies when calculating radiative power out. What, do you imagine that these cooler bodies are somehow "sucking" power away from the heat source? And that a warmer body (but still cooler than the source) "sucks" less power than colder ones do? That seems to be what you're saying here.

Just no. That's not the way it works, man. **At steady-state,** radiative power out can be calculated from temperature and emissivity alone. Other factors (such as heat transfer) are affected by nearby bodies, but radiative power out of a gray body at steady-state is related ONLY to temperature and emissivity. It's that simple, and claiming otherwise is just wrong.

I repeat: look it the hell up. I have not just one but 4 textbooks here, plus Wikipedia, plus the testimony of experts in the field of heat transfer. They ALL disagree with you. It's that simple.

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Re:Jane/Lonny Eachus goes Sky Dragon Slayer (Score:2)

by Jane Q. Public (1010737) Friend of a Friend on 2014-10-05 13:14 (#48069445)
For other readers (not for you, because despite your claims you've seen this already several

times), from Wikipedia (edited here for clarity given Slashdot's character handling):

A body that does not absorb all incident radiation (sometimes known as a grey body) emits less total energy than a black body and is characterized by an emissivity, *epsilon*
j* = *epsilon* * *sigma* * T^4

In the above equation, using the "dot" notation which YOU pointed out to ME, j is energy and j* is power. This isn't *just* Wikipedia. It is very easy to find this relation in other sources as well:

Here is *"A Textbook of Engineering Thermodynamics* . The section on radiative power of a gray body:

Since all bodies are continuously receiving and radiating thermal energy, energy radiating from unit area (all this energy is absorbed by the black surroundings) = sigma * emissivity * T^4

The example goes on to express heat transfer between long co-axial cylinders using **heat transfer** equations similar to those we discussed before. But heat transfer is NOT the same as the radiative power of a SINGLE gray body at steady-state. Power out is a function of emissivity and temperature ONLY. Heat transfer from one surface to another requires 2 bodies, or 2 surfaces of the same body. But note that the equation for power out clearly implies **it is independent of *transfer* to cooler bodies.**

You can also find it here. In this case, note that it gives the equation for power output **as distinct from** radiation "loss" (heat transfer). BECAUSE THEY ARE TWO DIFFERENT THINGS. One is the power output of a SINGLE gray body at a given temperature. The other is radiative **transfer** to another body. One requires ONLY emissivity and temperature to calculate. The other involves 2 bodies.

Is this clear yet? Or are you going to continue to erroneously claim that radiative POWER output is dependent on the presence of cooler bodies? Do you really need more examples, or are you finally willing to admit you have been proved wrong? If you need more examples of this, you can find them with a quick search of the 'net. I just did, since I don't have a good way to link to my textbooks.

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Jane/Lonny Eachus goes Sky Dragon Slayer (Score:2)

by khayman80 (824400) on 2014-10-05 14:00 (#48069605) Homepage Journal

> ... Your misguided attempt to include the power used to cool the chamber walls does not change that. ... It is neither necessary nor called for to calculate the power used to cool the chamber walls in order to find the temperatures of the other bodies. ... ***[Jane Q. Public, 2014-10-05]***

Good grief, Jane. Once again, I **never** attempted to include the power used to cool the chamber walls! In fact, I've repeatedly told you it's irrelevant. Once again, that's not what "power out" means. Months ago, after I asked Jane if he agreed that power in = power out, Jane misunderstood my question and responded:

> ... As long as the power used by the source and the power used by the cooler are constant as required, any relationship between them has no bearing on the experiment. ***[Jane Q. Public, 2014-08-02]***

So I explained that *"I've never even mentioned the power used by the cooler of the chamber walls... **none** of these equations has anything to do with the power used by the cooler. ... Jane's also wrong to claim that the power used* *by the cooler is required to be constant. ..."*

I tried again a month later: *"I've repeatedly failed to explain that the power consumed by the refrigerator on the outside is irrelevant. So obviously we'll have to agree to disagree about that."*

I tried once again: *"... Jane might think I meant power in = electrical heating power, and power out = cooling power of the chamber walls. If so, that's not what I meant, and I'm sorry for not being more clear. I take full responsibility. Just to be clear, power in = power flowing **into** the boundary in question, and power in = power flowing **out** of that boundary. ... any power used by the cooler is simply being moved from some point outside the boundary to another point which is **also** outside the boundary. Because that power never crosses the boundary, it's irrelevant."*

I tried yet again: *"I've explained why the power used to set the chamber wall temperature is irrelevant. Any power used is simply being moved from some point outside the boundary to another point which is **also** outside the boundary. Because that power never crosses the boundary, it's irrelevant."*

> ... Your misguided attempt to include the power used to cool the chamber walls does not change that. ... It is neither necessary nor called for to calculate the power used to cool the chamber walls in order to find the temperatures of the other bodies. ... ***[Jane Q. Public, 2014-10-05]***

After I repeatedly explained that the power used to cool the chamber walls is irrelevant, it's bewildering that Jane accuses me of trying to include it.

> ... The problem is that an analysis of this kind, **based on** the assumption that power-in = power-out, is doomed to fail except in coincidental cases. Even conservation of energy can give very misleading results. ...

> 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. ***[Jane Q. Public, 2014-09-07]***
>
> ... I know energy is always conserved, you insufferable ass. ... ***[Jane Q. Public, 2014-10-05]***

Charming. So we can agree that an analysis based on the assumption that power in = power out **isn't** doomed to fail? We can agree that power in = power out **is** necessarily true for **all** boundaries where nothing inside is changing, not just for coincidental very rare exceptions? That's great. For some odd reason I thought you were disputing those points.

> > > Again, it really sounds like Jane opened a textbook and found "radiative power out per square meter = (e*s)*T^4" and simply assumed that "radiative power out" is just a fancy way of saying "electrical heating power". Is that how Jane "derived" his incorrect equation that electrical heating power per square meter = (e*s)*T1^4?
>
> ... Your insistence on "electrical heating power" is a red herring. Energy is energy. ... **(e*s)*T1^4** is often called the "Stefan-Boltzmann relation", which is **derived from** the Stefan-Botlzmann radiation law, and which describes the relationship between thermodynamic temperature and radiative power output **of a single gray body**. I

> repeat: you can find this equation in heat transfer textbooks and I also showed you where it is in Wikipedia. ... **At steady-state,** radiative power out can be calculated from temperature and emissivity alone. Other factors (such as heat transfer) are affected by nearby bodies, but radiative power out of a gray body at steady-state is related ONLY to temperature and emissivity. It's that simple, and claiming otherwise is just wrong. ... I repeat: look it the hell up. I have not just one but 4 textbooks here, plus Wikipedia, plus the testimony of experts in the field of heat transfer. They ALL disagree with you. It's that simple. ***[Jane Q. Public, 2014-10-05]***

Once again, Jane, you have 4 textbooks that say "radiative power out per square meter = (e*s)*T^4". Since I've repeatedly agreed with that statement, those textbooks don't disagree with me.

Once again, I'm actually saying that "radiative power out" is different than "electrical heating power".

> There is no need to account for other, cooler bodies when calculating radiative power out. What, do you imagine that these cooler bodies are somehow "sucking" power away from the heat source? And that a warmer body (but still cooler than the source) "sucks" less power than colder ones do? That seems to be what you're saying here. ***[Jane Q. Public, 2014-10-05]***

Once again, Jane, I never said we need to account for other, cooler bodies when calculating radiative power out.

Once again, I'm actually saying that "radiative power out" is different than "electrical heating power". For instance, we agree that "radiative power out" stays constant even if the chamber walls are also at 150F, but "electrical heating power" goes to zero. So they **can't** be the same.

If you want to propose some relationship between "radiative power out" and "electrical heating power" then you need to use conservation of energy.

> ... I'm not the one who got it wrong. YOUR answer (checked 3 different ways) violated conservation of energy. Not mine. Again: I checked both my work and yours. Your "answer" didn't even check out using your own heat transfer equations. ... I have already proved that my answer conserved energy and yours did not. ... ***[Jane Q. Public, 2014-10-05]***

Again, Jane got nonsensical answers and had to invent a new energy conservation law where power adds to the energy inside a boundary even if it never crosses that boundary. Correctly applying conservation of energy shows that Jane's electrical heating power drops in half after it's enclosed. But since Jane seems convinced that he held the electrical heating power constant, we clearly disagree about the principle of 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:

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

Instead of cussing and screaming, could you calmly explain why you disagree with this energy conservation equation?

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Jane/Lonny Eachus goes Sky Dragon Slayer (Score:2)

by khayman80 (824400) on 2014-10-05 14:30 (#48069727) Homepage Journal

> ... heat transfer is NOT the same as the radiative power of a SINGLE gray body at steady-state. ... ***[Jane Q. Public, 2014-10-05]***

I've explained that net heat transfer = radiative power out - radiative power in, so **of course** they're not the same.

> ... Power out is a function of emissivity and temperature ONLY. ... ***[Jane Q. Public, 2014-10-05]***

I've repeatedly failed to communicate that I agree radiative power out is a function of emissivity and temperature only:

"Again, radiative power out is dependent only on emissivity and thermodynamic temperature. We don't disagree about that, despite your repetitive claims to the contrary."

Once again, I'm just saying that "radiative power out" is different than "electrical heating power".

> ... But note that the equation for power out clearly implies **it is independent of *transfer* to cooler bodies.** ... ***[Jane Q. Public, 2014-10-05]***

I've repeatedly failed to communicate that I agree radiative power out is independent of *transfer* to cooler bodies:

"Once again, I agree that "power out" through a boundary drawn around the heat source is given by the Stefan-Boltzmann law."

Once again, I'm just saying that "radiative power out" is different than "electrical heating power".

> ... In this case, note that it gives the equation for power output as distinct from radiation "loss" (heat transfer). BECAUSE THEY ARE TWO DIFFERENT THINGS. One is the power output of a SINGLE gray body at a given temperature. The other is radiative transfer to another body. One requires ONLY emissivity and temperature to calculate. The other involves 2 bodies. ... ***[Jane Q. Public, 2014-10-05]***

Exactly. Radiative power out is different than electrical heating power, because only electrical heating power goes to zero when the chamber walls are also at 150F. So electrical heating power involves 2 bodies, but radiative power out requires ONLY emissivity and temperature to calculate.

> ... are you going to continue to erroneously claim that radiative POWER output is dependent on the presence of cooler bodies? ... ***[Jane Q. Public, 2014-10-05]***

I've **never** claimed that radiative power out is dependent on the presence of cooler bodies. Once again, I've repeatedly agreed that radiative power output doesn't depend on the presence of cooler bodies:

"I've been trying to tell Jane: we don't disagree about the equation for radiative power out."

Once again, I'm claiming that "radiative power out" is different than "electrical heating power". For instance, we agree that "radiative power out" stays constant even if the chamber walls are also at 150F, but "electrical heating power" goes to zero. So they **can't** be the same.

If you want to propose some relationship between "radiative power out" and "electrical heating power" then you need to use conservation of energy.

Here's how to use the principle of 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:

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

Instead of cussing and screaming, could you calmly explain why you disagree with this energy conservation equation?

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Re:Jane/Lonny Eachus goes Sky Dragon Slayer (Score:2)

by Jane Q. Public (1010737) Friend of a Friend on 2014-10-05 23:48 (#48071325)

I've explained that net heat transfer = radiative power out - radiative power in, so of course they're not the same.

Your BS "explanations" are not informative to readers who actually want to be educated.

Once again, I'm just saying that "radiative power out" is different than "electrical heating power".

No, you aren't, because then your "explanation" re-introduces the dependency. Which is what I have been saying all along (and repeatedly): your methodology contradicts itself.

I'm not even going to bother answering the rest of your blather. Because your whole argument was PUT to rest weeks ago and your failure to understand that (or at least admit it) is rather like a zombie which hasn't quite realized it is dead yet.

I repeat: I have documented this all. I have the reputable and credible (and MAINSTREAM, "ACCEPTED") references which show you to be wrong.

For a while I thought explaining this in different ways would show you that you were wrong. But over time, I have come to accept that you simply won't admit it, no matter what. That's too bad, because I had really hoped you would listen to the actual accepted SCIENCE behind this, and further accept that it was right and you were wrong.

I no longer hold any such hope. I have myself come to accept that you are either a religious zealot, or a self-interested liar.

And I very seriously doubt that you were ever actually a physicist.

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Jane/Lonny Eachus goes Sky Dragon Slayer (Score:2)

by khayman80 (824400) on 2014-10-06 0:10 (#48071389) Homepage Journal

> > Once again, I'm just saying that "radiative power out" is different than "electrical heating power".
>
> No, you aren't, because then your "explanation" re-introduces the dependency. ***[Jane Q. Public, 2014-10-05]***

Seriously, "radiative power out" is different than "electrical heating power". For instance, we agree that "radiative power out" stays constant even if the chamber walls are also at 150F, but "electrical heating power" goes to zero. So they **can't** be the same.

This **doesn't** cause "radiative power out" to depend on anything but its emissivity and temperature.

If you want to propose some relationship between "radiative power out" and "electrical heating power" then you need to use conservation of energy.

Here's how to use the principle of 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:

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

Instead of calling me a blathering religious zealot liar who wasn't ever actually a physicist, could you calmly explain why you disagree with this energy conservation equation?

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Re:Jane/Lonny Eachus goes Sky Dragon Slayer (Score:2)

by Jane Q. Public (1010737) Friend of a Friend on 2014-10-06 8:20 (#48073569)

Seriously, "radiative power out" is different than "electrical heating power". For instance, we agree that "radiative power out" stays constant even if the chamber walls are also at

150F, but "electrical heating power" goes to zero. So they can't be the same.

You're just re-hashing old arguments that I've already shot down.

Why are you doing that, if your purpose is not dishonest?

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Re:Jane/Lonny Eachus goes Sky Dragon Slayer (Score:2)

by Jane Q. Public (1010737) Friend of a Friend on 2014-10-06 8:39 (#48073687)

Seriously, "radiative power out" is different than "electrical heating power". For instance, we agree that "radiative power out" stays constant even if the chamber walls are also at 150F, but "electrical heating power" goes to zero. So they can't be the same.

I didn't say they were the same. They don't need to be the same.

This doesn't cause "radiative power out" to depend on anything but its emissivity and temperature.

If you want to propose some relationship between "radiative power out" and "electrical heating power" then you need to use conservation of energy.

What "I propose" is the textbook answer to this question. It's not even "my" idea, as I clearly showed you just yesterday. YOU are the one going against "established" physics here. So I daresay it's up to you to prove your point, rather than arguing with me about it.

Which you will never do, because you're wrong. If you could actually show how the **physics textbook** idea of heat transfer was wrong, you would be world famous by now.

Instead, you're arguing ineffectively with some person on Slashdot, about something every textbook on the subject, as well as other sources, say your are wrong about.

Instead of calling me a blathering religious zealot liar who wasn't ever actually a physicist, could you calmly explain why you disagree with this energy conservation equation?

I already did so, several times. What, do you **honestly** think that If I fail to refute this idea just *one more time*, it will somehow magically become correct?

The heat transfer scenario I presented, and my calculations of temperatures, were correct within a reasonable degree of precision. Yours, on the other hand, were not.

By what stretch of your imagination am I obligated to KEEP refuting your same, lame arguments? This is all old news now. You can read about it all again later, when I write this all up and publish it. In the meantime, if you want answers to these questions AGAIN, you can go back and read our prior discussion of the matter.

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Jane/Lonny Eachus goes Sky Dragon Slayer (Score:2)

by khayman80 (824400) on 2014-10-06 9:40 (#48074143) Homepage Journal

> You're just re-hashing old arguments that I've already shot down. Why are you doing that, if your purpose is not dishonest? ***[Jane Q. Public, 2014-10-06]***

Dishonest? Shot down? Have you even considered the possibility that radiative power out **might actually be different** than electrical heating power?

For instance, we agree that "radiative power out" stays constant even if the chamber walls are also at 150F, but "electrical heating power" goes to zero. So they **can't** be the same. Is saying that dishonest?

This **doesn't** cause "radiative power out" to depend on anything but its emissivity and temperature. Is saying that dishonest?

If you want to propose some relationship between "radiative power out" and "electrical heating power" then you need to use conservation of energy. Is saying that dishonest?

Here's how to use the principle of 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:

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

Instead of calling me dishonest, could you calmly explain why you disagree with this energy conservation equation?

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Jane/Lonny Eachus goes Sky Dragon Slayer (Score:2)

by khayman80 (824400) on 2014-10-06 10:17 (#48074449) Homepage Journal

> What "I propose" is the textbook answer to this question. It's not even "my" idea, as I clearly showed you just yesterday. YOU are the one going against

> "established" physics here. So I daresay it's up to you to prove your point, rather than arguing with me about it. Which you will never do, because you're wrong. If you could actually show how the **physics textbook** idea of heat transfer was wrong, you would be world famous by now. Instead, you're arguing ineffectively with some person on Slashdot, about something every textbook on the subject, as well as other sources, say your are wrong about. ***[Jane Q. Public, 2014-10-06]***

Once again, your textbooks don't say I'm wrong. They just say that "radiative power out per square meter = (e*s)*T^4". Once again, I agree with that statement. So how am I going against "established" physics or arguing with "every textbook on the subject"?

> > Seriously, "radiative power out" is different than "electrical heating power". For instance, we agree that "radiative power out" stays constant even if the chamber walls are also at 150F, but "electrical heating power" goes to zero. So they can't be the same.
>
> I didn't say they were the same. They don't need to be the same. ***[Jane Q. Public, 2014-10-06]***

Jane, you're saying:

electrical heating power out per square meter = (e*s)*T1^4.

But the Stefan-Boltzmann law in your textbooks actually says:

radiative power out per square meter = (e*s)*T1^4.

Jane, don't you see how your equation for electrical heating power would only be true if "radiative power out = electrical heating power"? If you "didn't say they were the same" then why does your equation depend on them being the same?

> > Instead of calling me a blathering religious zealot liar who wasn't ever actually a physicist, could you calmly explain why you disagree with this energy conservation equation?
>
> I already did so, several times. What, do you **honestly** think that If I fail to refute this idea just *one more time*, it will somehow magically become correct? The heat transfer scenario I presented, and my calculations of temperatures, were correct within a reasonable degree of precision. Yours, on the other hand, were not. By what stretch of your imagination am I obligated to KEEP refuting your same, lame arguments? This is all old news now. You can read about it all again later, when I write this all up and publish it. In the meantime, if you want answers to these questions AGAIN, you can go back and read our prior discussion of the matter. ***[Jane Q. Public, 2014-10-06]***

Jane seemed to try to explain why he disagrees here by saying "A = A" and helpfully asking if I knew what a zero was. But as usual Jane refused to actually write down what Jane considered to be the "correct" energy conservation equation. When I asked what equation Jane meant, Jane said that wasn't it. So Jane's never written down an energy conservation equation around the heated source, which is the first step to calculating the required electrical heating power.

Here's how to use the principle of 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:

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

Instead of calling me dishonest, could you calmly explain why you disagree with this energy conservation equation? If you disagree with that equation, it would be very easy and very fast to write down the energy conservation equation you think is correct. Just fill in these blanks:

Jane's power in = ?
Jane's power out = ?

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Re:Jane/Lonny Eachus goes Sky Dragon Slayer (Score:2)

by khayman80 (824400) on 2014-10-06 11:37 (#48075389) Homepage Journal

Typo: Jane, you're saying: electrical heating power per square meter = (e*s)*T1^4.

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Re:Jane/Lonny Eachus goes Sky Dragon Slayer (Score:2)

by Jane Q. Public (1010737) Friend of a Friend on 2014-10-07 21:48 (#48089027)

But the Stefan-Boltzmann law in your textbooks actually says:

radiative power out per square meter = (e*s)*T1^4.

Jane, don't you see how your equation for electrical heating power would only be true if "radiative power out = electrical heating power"?

This, from someone who keep saying "power in = power out"?

Of course I realize that. That is, TOTAL power out equals (power out per unit area) * area. When are you going to get it through your head that I'm not a moron?

The problem with your theory is that you have failed to show that electrical power in = anything BUT power out. **It isn't heat transfer, as you have several times asserted.** Heat transfer to a cooler body has NO relevance to the radiated power output of a warmer body at known temperature. And since it does not affect the power out, it does not affect the power in. QED.

You're trying to give me some crackpot story that the temperature of nearby bodies reduces the required INPUT power for the heat source. I understand what you're saying. I understood it from the beginning. You're just wrong, that's all. It would violate your own "power in = power out" rule. Which obviously you are not seeing, but which I saw right away.

Cooler bodies do NOT lend or transfer any net energy via radiation to warmer bodies. Period. Doing so would be a violation of the Second Law of Thermodynamics. Therefore, the only way a nearby cooler body could create some kind of condition of "less input power needed" for the warmer body, was via magic. You are proposing a magical idea, not physics. Because, again, this violates your "power in = power out" rule. If you draw your boundary around just the heat source itself, since there is NO NET RADIATIVE POWER COMING IN (which doesn't then just go right back OUT, yielding a net of 0), then the only way you can reduce your "electrical" power input is by violating the Second Law.

You're trying to play some kind of trick of adding the incoming radiation to the power output. But that's wrong. No NET incoming radiation is absorbed. Some may be absorbed, but it goes right back again, at equivalent radiant energy. **But** that power going back out again is not "added" to the object's radiant power, which is independent. Again, that would violate your "power in = power out" rule: you're counting it twice.

That is exactly WHY you can calculate power out of a gray body at steady-state with (e * s) * T^4. Because any incoming radiation is **already** accounted for. Which you aren't getting through your head, and so you're counting it twice.

And no, the cooler bodies don't "prevent" the hotter body from radiating exactly as much as it was radiating before. They don't "lend" their radiation to the hotter body.

ALL net energy flow in this system is from the center outward. There is no "backflow". It would violate the Second Law. And **your** "answer" for final temperature of the heat source did exactly that... you were "creating" something like 3kW (I forget the exact number now) from nothing.

And don't try to tell me you're calculating the TOTAL electrical power needed to both heat the source and cool the walls, because that would be a different experiment. Spencer stipulated "electrical power" **to the heat source**. He left power to the walls unstated, except to say that they are maintained at 0 degrees F. He did not say the power to the heat source AND to the walls was constant. He said the power to the heat source.

So if necessary, technically the power **to the walls** could vary, but not the power to the heat source. And if you're having a big issue with conservation of energy, that's probably where you're falling down.

You have kept trying to convince me that the cooler passive body somehow "holds the source power in" and thereby makes it hotter. But that's not the way it works. I repeat: EVERY textbook and online reference I've found -- and it's a significant list by now -- disagrees with you. **Your own answer** disagreed with you: it didn't balance the heat transfer equations, and power in <> power out.

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Jane/Lonny Eachus goes Sky Dragon Slayer (Score:2)

by khayman80 (824400) on 2014-10-07 22:22 (#48089125) Homepage Journal

> ... don't try to tell me you're calculating the TOTAL electrical power needed to both heat the source and cool the walls, because that would be a different experiment. Spencer stipulated "electrical power" **to the heat source**. He left power to the walls unstated, except to say that they are maintained at 0 degrees F. He did not say the power to the heat source AND to the walls was constant. ... ***[Jane Q. Public, 2014-10-07]***

Again, I've repeatedly explained that the power needed to cool the walls is irrelevant, and that it isn't required to be constant.

> The problem with your theory is that you have failed to show that electrical power in = anything BUT power out. **It isn't heat transfer, as you have several times asserted.** Heat transfer to a cooler body has NO relevance to the radiated power output of a warmer body at known

> temperature. And since it does not affect the power out, it does not affect the power in. QED. ***[Jane Q. Public, 2014-10-07]***

Again, why does Jane think if something doesn't affect the power out, it can't affect the power in? For example, black body "power in" depends on the chamber walls even though "power out" through that boundary doesn't depend on the chamber walls.

Since we agree that "electrical heating power" goes to zero when the chamber walls are also at 150F, has Jane also noticed that "net heat transfer" also goes to zero when the chamber walls are also at 150F?

Isn't that a weird coincidence? So why does Jane keep using an equation that depends on "electrical heating power = radiative power out" without even writing down an energy conservation equation to try to justify that claim? Has Jane even considered the possibility that if he applied conservation of energy, he'd find that electrical heating power really is determined by net heat transfer, rather than "radiative power out" which stays constant even if the chamber walls are also at 150F?

> If you draw your boundary around just the heat source itself, since there is NO NET RADIATIVE POWER COMING IN (which doesn't then just go right back OUT, yielding a net of 0)... ***[Jane Q. Public, 2014-10-07]***

If there's no net radiative power coming in, that must mean all the "power in" from the chamber walls just goes back out. That would yield a net of zero. But as usual Jane didn't write down the power in = power out equation showing these terms before they supposedly cancel. Is this what you mean, Jane?

Draw a boundary around the heat source:
Jane's power in = electrical heating power + radiative power in from chamber walls
Jane's power out = radiative power out from source + radiative power from chamber walls, re-emitted back out

At steady state, Jane's power in = Jane's power out:

electrical heating power + radiative power in from chamber walls = radiative power out from source + radiative power from chamber walls, re-emitted back out (Jane's equation?)

Jane, is that your equation for required electrical heating power? By "NO NET RADIATIVE POWER COMING IN", are you saying "radiative power in from the chamber walls" = "radiative power from chamber walls, re-emitted back out"?

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Jane/Lonny Eachus goes Sky Dragon Slayer (Score:2)

by khayman80 (824400) on 2014-10-08 22:21 (#48100157) Homepage Journal

Jane responds.

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Re:What will happen to their physical condition (Score:3)

by RockDoctor (15477) Friend on 2014-10-04 11:09 (#48063745) Journal

> Shielding of 4.41 tons/m^2 [nasa.gov] is sufficient.

Hmmmm, My fist estimate on this sort of this is to look at the Earth's atmosphere. Living at the bottom of the atmosphere is good enough for a lifetime's shielding from interplanetary radiation. One atmosphere is equivalent to 10m of water depth (consult your diving manuals). That's 10 tonnes per square metre of protected area. Half of that amount - sounds reasonably credible. What material to use? Well, air is evidently sufficient (see "lifetime" above).

Water is convenient - you'll need a considerable quantity any way. Some metals for taking out the slowed down and secondary radiations. But you'll need be needing metals anyway. I'd probably let the outer parts of it freeze to ice, for a degree of micrometeorite protection, and for the same reason you'll want several layers of it.

--
Birds are not dinosaur descendants; birds **are** dinosaurs, for all useful meanings of "birds", "are" and "dinosaurs

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Re:What will happen to their physical condition (Score:2)

by khayman80 (824400) on 2014-10-04 12:25 (#48064133) Homepage Journal

Yep. That's the same sanity check used by that NASA study:

"Passive shielding is known to work. The Earth's atmosphere supplies about 10 t/m^2 of mass shielding and is very effective. Only half this much is needed to bring the dosage level of cosmic rays down to 0.5 rem/yr. In fact when calculations are made in the context of particular geometries, it is found that because many of the incident particles pass through walls at slanting angles a thickness of shield of 4.5 t/m^2 is sufficient."

Water could be an effective shield, and would be especially easy to apply and repair. Just melt it and let it freeze in place. That's how most of the lighthuggers in Revelation Space were shielded, as well as the starship in *Songs of Distant Earth*.

The only downsides I can think of would be the low tensile strength, so a water shield couldn't spin with a rotating ship, and the fact that if the ship overheats then its radiation shield sublimates away...

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Re:What will happen to their physical condition (Score:3)

by RockDoctor (15477) Friend on 2014-10-04 19:01 (#48065887) Journal

> The only downsides I can think of would be the low tensile strength, so a water shield couldn't spin with a rotating ship, and the fact that if the ship overheats then its radiation shield sublimates away...

I don't really see that as being an issue of any import. The marine industries have lots of experience of moving fluids around. We (I work at sea) uniformly stow and move fluids in multiple tanks of relatively small cross-sectional area. It reduces (as you seem to be worried about) "slosh" effects as the vessel accelerates, turns, decellerates etc. So in the spaceship context, you'd have multiple shells of (relatively) small tanks with plumbing between them and pump manifolds so that you can choose which tanks to fill at which time. You'd also probably need a set of plumbing for pumping steam around too (it's an effective way of moving heat).

Overheat such a radiation shield and at worst some of the liquid melts. Oh, you'd need to incorporate some expansion tanks for managing the volume changes on freezing / melting. Having spent enough nights of my life trying to clear sample lines plugged with ice, I've been looking at how to get around this for ages, and have a little dream of sample lines with strips of bubble-wrap type material along their interior to avoid splitting the damned things. The same sort of concept could accommodate the volume changes in your "ice shell shielding".

Rocket science, it ain't.

--
Birds are not dinosaur descendants; birds **are** dinosaurs, for all useful meanings of "birds", "are" and "dinosaurs

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Re:What will happen to their physical condition (Score:2)

by khayman80 (824400) on 2014-10-04 19:17 (#48065947) Homepage Journal

That makes sense. I was thinking in terms of the lighthuggers in Revelation Space which are literally "glazed" in water ice because that's cheaper than setting up a system of tanks and pumps. That shield would be very easy to repair even after a collision with a "large" micrometeorite because there would be no infrastructure. Just melt more water and apply.

The system you describe would also be useful as an alternate (albeit temporary) way to dump heat in case the external radiators were damaged. I've been thinking about a similar setup, but using loop heat pipes instead of steam pumps because heat pipes don't have moving parts.

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Re: What will happen to their physical condition (Score:3)

by RockDoctor (15477) Friend on 2014-10-06 3:52 (#48071909) Journal
Your water chamber "floors" "ceilings" and "walls", plus several levels of interlinkage can be made to uniform design. It's a trick called "mass production". Given that, manufacture comes by robotic production, followed by assembly with humanoids to gasket between

units and apply sealant.

Having most of your shielding as solid most of the time eases the sealing problems considerably. (Spend a year maintaining gas test equipment. You'll grow to love solids and the way they don't go through holes.)

These are issues of industrial design. Look at the way that shipbuilding costs and times have fallen as one - off craft design has been replaced by prefabrication (e.g. riveting plates together as opposed to building slices of a ship in a yard and welding them together). The same methodology changes are needed in space. If that implies a step change in launch costs and QC. .. well, it does.

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Re: What will happen to their physical condition (Score:2)

by khayman80 (824400) on 2014-10-06 12:04 (#48075719) Homepage Journal

I suspect that glazing a ship in ice would always be cheaper than building a network of chambers to act as a radiation shield. That's because it seems like improvements in robotic construction (prefabrication, etc.) could also be applied to the glazing process.

It seems even more likely that the repair costs of a "glazed" shield would be lower than a shield made out of water chambers. If a "large" micrometeorite blasts a chunk of a glazed shield away, you just send a robot with a water tank out to the hole and let it spray more water on the shield. If that micrometeorite hits a shield made out of water chambers, you have to repair or replace whatever chambers and pumps were damaged in the explosion.

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Re: What will happen to their physical condition (Score:3)

by RockDoctor (15477) Friend on 2014-10-08 16:15 (#48097941) Journal

> I suspect that glazing a ship in ice would always be cheaper than building a network of chambers to act as a radiation shield.

Vapour pressure is not your friend. At temperatures where water is liquid, it has a high enough vapour pressure (6.1173 millibars) that it will evaporate pretty rapidly. You'd need to cover your water glazing with something - probably something thicker than cling film. Sure, for patching, your repair robot can carry patches (I was applying a patch to my bike tube this afternoon - the parallel amuses me) to glue, loosely, over the hole before starting to spray the water. Maybe the water has ... glass fibre or wood pulp in it, to add mechanical strength. But that vapour pressure is going to be a problem.

Maybe you'd surround your outermost structure with bladders like this for the outermost protection ... engineering details. Velcro and/ or webbing straps to get them to stick together, but be repairable/ replaceable. A couple of sizes to fit all options ; it doesn't have to be a tight fit, just solid enough to do the job.

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Re: What will happen to their physical

condition (Score:2)

by khayman80 (824400) on 2014-10-08 19:38 (#48099247) Homepage Journal

Yes, liquid water's vapor pressure is a problem in vacuum. Your solution seems like a good idea: loosely glue a patch over the hole before spraying. After the water freezes, its vapor pressure also decreases. Then the patch could be removed and reused if the cost of dealing with the remaining sublimation loss is less than the cost of replacing bladders hit by micrometeorites.

The remaining sublimation loss could be minimized by keeping the glazed shield as cold as possible. At first it seemed like this would be easier in the outer solar system, but then I realized that the side of the ship facing the sun would probably be covered with solar panels anyway. Moving farther from the sun either requires larger solar panels, or a large cheap mirror to collect more sunlight.

So the most important variable is how much power the ship needs. I'm working on a simple design which has enough garden space to feed 4 people, and I calculated the power needed to light the garden as it would be lit on Earth. Assuming blackbody radiators at 0C (which puts a lower bound on the attainable interior temperature), dissipating that power requires that ~30% of the ship's surface not covered with solar panels would need to be covered with radiators.

And that's just the power needed to light the garden. So you're probably right: it would be better to cover the rest of the surface with bladders to reduce sublimation loss. Those bladders could be covered with radiators and individually connected or disconnected to the ship's interior via insulated loop heat pipes.

Also, I liked your pykrete link. Wood pulp is likely to be expensive in space, but glass fiber made from moon dust could probably be cheap.

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Re: What will happen to their physical condition (Score:3)

by RockDoctor (15477) Friend on 2014-10-09 1:39 (#48100799) Journal

> the cost of replacing bladders hit by micrometeorites.

Think back to the bike tube I was repairing. Why empty, move and replace a bladder for a relatively small hole when you can apply a patch in-situ? (I first met those bladders as non-potable water storage on a desert island off the coast of Tanzania. They're laid out on roughly cleared ground, and when you pump ten tonnes of water into one, it's not uncommon for a stone to rip the bottom. Since you're pumping water from the shuttle tanker, you need to fix the leak *quickly*, so the mud man used a pole and clip arrangement to pinch the leak closed. Since low pressures are involved, it's sufficient (of course, that bladder gets used first, so a glued patch can be applied at leisure).

> The remaining sublimation loss could be minimized by keeping the glazed shield as cold as possible. At first it seemed like this would be easier in the outer solar system, but then I realized that the side of the ship facing the sun would probably be covered with solar panels anyway.

I think we got into this discussion talking about rotating ships, to provide midi-gravity. We know that microgravity requires a lot of effort to counteract, so ... you're going to need some major engineering reasons to not go down the spin-for-pseudo-gravity route. And on your general voyage (no, you don't design a vessel for only **one** voyage - craft design versus industrial production?) you are going to have a component of travel which is not radial to the Sun. Therefore, essentially all parts of the ship's surface are going to have alternating exposure to light and dark. So now, your mass production design moves to coating the whole of the ship with cheap-as-you-can-get solar cells. Which in the context of the design we're iterating would mean the bladders have solar cells on one side ("this side out"), and part of the hook-up includes plugging the solar cells into the vessel's power bus. Actually, revise that - the bladders aren't exactly lightweight, so including some power conditioning and a battery would provide you with options for powering condition-monitoring, condition reporting by wireless, maybe even corner-stretching propulsion to assist emplacement.

> corner-stretching propulsion

Doh ! The terrestrial bladders I'm familiar with are rectangular, but lenticular shape may well be more appropriate. referring back to the small range of standard sizes - maybe also some range in shapes, but you do not want the ships stores to be carrying 35 different stock lines, half of which won't be used. And of course, all of the different models use the same fittings, electronics, fixings, etc (I was about to make a point about the different fire-hose fittings on last-months vessel compared to next week's vessel. But while looking for illustrations, I came across this page, which makes the point by *reductio ad absurdam* .)

> or a large cheap mirror to collect more sunlight.

Now that's a point. A good one. Yeah, hanging a solar sail off an axial protrusion would boost your power production (90% exposure time instead of 50%) nicely, and help with the radial component of your velocity management too. At destination, hang a science package off the solar sail then cast it adrift - probably easier than attempting to recover.

> Those bladders could be covered with radiators and individually connected or disconnected to the ship's interior via insulated loop heat pipes.

Hmmm, I'd keep the components as simple as possible. Take a close look at the design of the ISS (because I've seen those designs online ; other spacecraft will have the same issues) : the radiators protrude in one direction *radial* to the Sun, but the solar panels are perpendicular to the Sun. If you rotate the system by 90 degrees, then the solar panels are useless and the radiators become heat absorbers. That's probably a large part of the reason for not rotating the ISS, but ... comments above about the effort needed to avoid the health problems of microgravity. How to get that heat out ... tricky ; it is possible to make rotary seals that work to high pressures, for long periods. But the damned things still leak. (In a Daily Operations Report I'd phrase it as "[washpipe || gooseneck] packer washed ; POOH to shoe ; change packer ; RIH and resume drilling", but that's an event that will cost between a half-million and 2 million dollars. Obviously we try to minimise such events, but I still don't like relying on rotary joints, particularly coaxial ones. I'd use them where unavoidable, but I'd avoid them where possible. And in life-support, they'd scare me.) I would arrange multiple radiator assemblies (so one can be down for maintenance without severely affecting environmental control) projecting radially from the vessel, and have a twisting arrangement with a limited range of rotation - up to 90 degrees -so that the radiator can be oriented radially to the Sun and rotated as the vessel rotates about an axis oblique to the Sun. Yeah, I can sketch that, and the only reason I can't CAD it is that I don't know any CAD packages.

Thermal management is an important issue. That is something that needs vessel-by-vessel design, but from standardised components.

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Re: What will happen to their physical

condition (Score:2)

by khayman80 (824400) on 2014-10-09 12:56 (#48105881) Homepage Journal

> I think we got into this discussion talking about rotating ships, to provide midi-gravity. We know that microgravity requires a lot of effort to counteract, so ... you're going to need some major engineering reasons to not go down the spin-for-pseudo-gravity route.

Yes, centrifugal gravity seems like the only way to stay healthy in space. I pointed out that long-term colonies shouldn't rotate faster than 1 rpm in order to avoid inducing motion sickness. That imposes such serious tensile strength requirements that it seems like the shield can't spin with the ship unless the ship is made of carbon nanotubes.

> Take a close look at the design of the ISS (because I've seen those designs online ; other spacecraft will have the same issues) : the radiators protrude in one direction radial to the Sun, but the solar panels are perpendicular to the Sun. If you rotate the system by 90 degrees, then the solar panels are useless and the radiators become heat absorbers. That's probably a large part of the reason for not rotating the ISS, but ... comments above about the effort needed to avoid the health problems of microgravity.

Yes, the ISS is a useful example. I'm proposing a modular design, where a sphere with interior radius of 10.7 meters has enough living and garden space to support 4 people. One sphere alone couldn't provide centrifugal gravity, but in that configuration the solar panels would be unfolded perpendicular to the Sun, and the radiators would be unfolded behind the sphere, radially away from the Sun.

But two spheres could dock and attach tethers at the top of each sphere. Then if they separate to a distance of 1800 meters, they could rotate at 1 rpm around their shared center of mass to produce 1g of centrifugal gravity.

If they're not going anywhere, their plane of rotation should probably be the ecliptic plane. Otherwise the Sun's orientation would change as they orbit the Sun. Each sphere's radiators could be attached to the tethers, parallel to the ecliptic plane so they never face the Sun.

During the docking procedure, each sphere's solar panel would be detached and remain at the midpoint between the spheres. They'd have to be able to move along the tether in case one of the spheres becomes heavier and moves the center of mass. The solar panels would be kept perpendicular to the Sun as the spheres rotate, so they'd have to be kept in place magnetically and transfer power to the spheres using induction or microwaves.

> I still don't like relying on rotary joints, particularly coaxial ones. I'd use them where unavoidable, but I'd avoid them where possible. And in life-support, they'd scare me.

Yeah, me too. That's why I spent more time than I'd care to admit trying to think of a way to arrange the solar panels that doesn't require a special magnetic rotary joint. At first I thought the sphere's plane of rotation should have a surface normal that points directly at the Sun. That way the solar panels could be attached directly to the tethers on the side that always faces the Sun, and the radiators could also be attached directly to the tethers, but at 90 degrees so they never face the Sun. They could also be attached to the side of the sphere which never faces the Sun.

That might be an emergency configuration if the magnetic rotary joint fails, but the sphere's plane of rotation stays fixed as they orbit the Sun. That means that in 4 months the configuration will have shifted by 90 degrees, making the solar panels useless.

It would be too expensive to continually use fuel to keep the sphere's plane of rotation in place relative to the Sun. Maybe an electrodynamic tether could work, but I haven't looked at that possibility in detail.

> And on your general voyage (no, you don't design a vessel for only one voyage - craft design versus industrial production?) you are going to have a component of travel which is not radial to the Sun. Therefore, essentially all parts of the ship's surface are going to have alternating exposure to light and dark.

I've been considering Hohmann transfer orbits because they only require thrust that's completely tangential to the Sun. In that case, the spheres' plane of rotation would be perpendicular to the ecliptic plane. This way, engines on the "side" of each sphere could provide thrust for the Hohmann transfer. If that thrust is large enough to perceptibly affect the direction of "down" then the spheres could simply tilt to keep the total effective gravity vector "vertical" relative to the sphere's floors. To keep that total effective gravity at exactly 1g, the spheres' rotation rate would have to be slowed.

One huge problem is that the shielding mass required to cover the sphere with 4.5 tons/m^2 is greater than 20,000 metric tons. Even if each sphere had a Saturn V rocket underneath it, it would only accelerate at 0.15 g for a few minutes. A fission or fusion rocket would probably be necessary to achieve any useful delta-v.

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Re: What will happen to their physical condition (Score:2)

by khayman80 (824400) on 2014-10-09 16:13 (#48107517) Homepage Journal

> That means that in 4 months the configuration will have shifted by 90 degrees, making the solar panels useless.

Oops. In **3 months**, or one quarter of an Earth year, the configuration will have shifted by 90 degrees.

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Re: What will happen to their physical condition (Score:2)

by khayman80 (824400) on 2014-10-09 16:53 (#48107733) Homepage Journal

> I've been considering Hohmann transfer orbits because they only require thrust that's completely tangential to the Sun. In that case, the spheres' plane of rotation would be perpendicular to the ecliptic plane.

Sorry, this is ambiguous. Here's a better explanation. I've been considering Hohmann transfer orbits because they only require thrust that's completely tangential to the Sun. In that case, the spheres' plane of rotation would be perpendicular to the ecliptic plane, with its surface normal pointing along the (circular) orbital velocity vector.

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Re: What will happen to their physical condition (Score:2)

by khayman80 (824400) on 2014-10-09 17:52 (#48108073) Homepage Journal

> I spent more time than I'd care to

> admit trying to think of a way to arrange the solar panels that doesn't require a special magnetic rotary joint.

Maybe the solar panels could be physically attached to the midpoint, and arranged in a circle with the same surface normal as the plane of rotation.

Ordinarily this would result in no solar power, regardless of whether the spheres' plane of rotation has the same surface normal as the ecliptic plane (the "parked" configuration) or if its surface normal points along the orbital velocity vector (the "Hohmann transfer" configuration).

But a large cheap mirror could reflect sunlight onto the circular solar panel, eliminating the need for a special magnetic rotary joint, and the inefficiency of microwave or inductive power transfer.

The mirror could be held in place against solar pressure using VASIMR drives. When the spheres are under thrust, the total fuel needed to move the mirror should be negligible compared to the fuel needed to move the heavily shielded spheres. Moving the mirror independently would allow the spheres' plane of rotation to change without reconfiguring its solar panels each time.

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Re: What will happen to their physical condition (Score:3)

by RockDoctor (15477) Friend on 2014-10-10 13:57 (#48115327) Journal
Woo, more in there than I'm going to try to deal with on a phone's screen - board. L8R
--
Birds are not dinosaur descendants; birds **are** dinosaurs, for all useful meanings of "birds", "are" and "dinosaurs

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Re:What will happen to their physical condition (**Score:1**)

by Jane Q. Public (1010737) Friend of a Friend on 2014-10-03 18:00 (#48060377)

Why should any 'sleep option' solve any radiation issue?

For reasons I explained but which you did not bother to read and understand.

I think it's hilarious that you blame me for your own failure to read.

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Re:What will happen to their physical condition (**Score:2**)

by angel'o'sphere (80593) Alter Relationship on 2014-10-03 18:56 (#48060615) Homepage Journal

You fail to read as well,
like me you only knee jerk react
to the first three rows of a post.

Otherwise you had realized I addressed your "failed to read" argument a few lines further down :D

They where wrong nevertheless ... good luck.

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Re:What will happen to their physical condition (**Score:2**)

by Jane Q. Public (1010737) Friend of a Friend on 2014-10-03 22:36 (#48061259)

You fail to read as well,

Unlike you, I didn't "fail" to read. The direction most of the dangerous radiation comes from is not irrelevant, BUT you seem to think that JUST because most comes from the sun, that's the only significant shielding needed.

Bullshit.

We already know better from experience. Why didn't YOU know that?

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Re:What will happen to their physical condition (Score:2)

by angel'o'sphere (80593) Alter Relationship on 2014-10-04 9:33 (#48063291) Homepage Journal

Because you and others are talking about shielding from the sun, rofl.
You can not shield a space craft against super high energetic 'radiation' anyway. (Or do you want to try to clad the whole thing in a 5m, 6m, 10m ... Xm thick lead armor?)
So bringing this point up now is arguing for arguings sake only ... pointless.

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Re:What will happen to their physical condition (Score:2)

by khayman80 (824400) on 2014-10-04 16:41 (#48065357) Homepage Journal
All those lead thickness options are too thick by at least a factor of 5. Even if that NASA study is "retarded", RockDoctor just mentioned

that Earth's atmosphere protects us with only ~10 tons/m^2. Since lead's density is 11 tons/m^3, a lead shield wouldn't have to be thicker than ~0.9 meter.

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Re:What will happen to their physical condition (Score:2)

by angel'o'sphere (80593) Alter Relationship on 2014-10-05 8:11 (#48068085) Homepage Journal

You are mixing some stuff up :) actually lots of it.
Radiation absorption is not measured in tons per m^3.
It is measured by the likelihood that an incoming particle hits enough atoms/molecules of the absorbing material to be harmless, usually caught in that material.

Similar to half time of decay we use a 'half value layer' ... but likely you are right and there are not multiple meters needed.

Bad article: http://en.wikipedia.org/wiki/H...
A better one: https://www.nde-ed.org/Educati...

You basically have to weight how often a craft will be hit by really high energy particles.

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Re:What will happen to their physical condition (Score:2)

by Jane Q. Public (1010737) Friend of a Friend on 2014-10-05 8:32 (#48068167)

You basically have to weight how often a craft will be hit by really high energy particles.

But this is the whole point.

"Really high energy particles" do not come exclusively from the sun. While we can agree that MOST of them do.

So -- again I think we agree -- shielding in non-sun-facing parts does not have to be anywhere near as heavy. HOWEVER... regardless of whether you are referring to sun shielding or shielding from the rest of space, reducing the volume (and cross-sectional area) of the crew area that needs to be shielded can make a big difference in the mass. And, as you probably know, reduce the volume and mass of the crew area and the entire ship can be a lot smaller from start to finish.

That is all I was saying.

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Re:What will happen to their physical condition (Score:2)

by khayman80 (824400) on 2014-10-05 10:23 (#48068767) Homepage Journal

> You are mixing some stuff up :)
> actually lots of it.
> Radiation absorption is not measured in tons per m^3.

If I'm mixing lots of stuff up, just explain how this NASA study was wrong to conclude that 4.41 tons/m^2 would be sufficient shielding.

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Re:What will happen to their physical condition (Score:2)

by angel'o'sphere (80593) Alter Relationship on 2014-10-05 10:48 (#48068869) Homepage Journal

Because no one uses tons per m^2 to describe radiation absobtion.
A measure like that would imply the material used is irrelevant, which it is not. The correct material is the prime shielding factor.

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- **Re:What will happen to their physical condition (Score:2)**

  by khayman80 (824400) on 2014-10-05 12:05 (#48069175) Homepage Journal

  > no one uses tons per m^2 to describe radiation absobtion.

  Except NASA: *"Passive shielding is known to work. The Earth's atmosphere supplies about 10 t/m^2 of mass shielding and is very effective. Only half this much is needed to bring the dosage level of cosmic rays down to 0.5 rem/yr. In fact when calculations are made in the context of particular geometries, it is found that because many of the incident particles pass through walls at slanting angles a thickness of shield of 4.5 t/m^2 is sufficient."*

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- **Re:What will happen to their physical condition (Score:2)**

  by angel'o'sphere (80593) Alter Relationship on 2014-10-05 13:20 (#48069471) Homepage Journal

  That is a laymen explanation for people like you.

I linked you the 'half value layer' articles ... metric tons per square meter are irrelevant.

Relevant is how dense the material is and what its actual properties are to 'break' or capture cosmic rays.

A ton of water simply does not equal a ton of lead, even if you believe so after you got missleaded by that NASA article :)

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Re:What will happen to their physical condition (Score:2)

by khayman80 (824400) on 2014-10-05 14:50 (#48069793) Homepage Journal

> That is a laymen explanation for people like you.

What do you mean by that? What are "people like me"? "Laymen"?

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Re:What will happen to their physical condition (Score:2)

by angel'o'sphere (80593) Alter Relationship on 2014-10-06 10:03 (#48074329) Homepage Journal

Obviously, otherwise you would not insist that weight per square meter is a useful measurement for radiation shielding.
Yes, you linked an article ... however I linked you the math behind that problem :)

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- **Re:What will happen to their physical condition (Score:2)**

  by khayman80 (824400) on 2014-10-06 10:33 (#48074639) Homepage Journal

  > > What do you mean by that? What are "people like me"? "Laymen"?
  >
  > Obviously...

  Why are you making assumptions about who I am? If you clicked on my homepage, it would only take a few seconds to realize that you're wrong. But more importantly, it's not necessary or productive to accuse someone of being a layman. There's no reason to be nasty. Just discuss the science, and leave your assumptions about who the other person is out of it.

  > I linked you the 'half value layer' articles ... metric tons per square meter are irrelevant.

  No. Metric tons per square meter = thickness * density, so if density is relevant then metric tons per square meter is also relevant.

  > Relevant is how dense the material is and what its actual properties are to 'break' or capture cosmic rays. A ton of water simply does not equal a ton of lead, even if you believe so after you got missleaded by that NASA article :)

  The NASA article I showed you explicitly calculated the required shielding using silicon dioxide (Moon dust) as I've failed to explain. They're not saying a ton of water exactly equals a ton of lead, and neither am I.

  > no one uses tons per m^2 to describe radiation absobtion. A measure like that would imply the material used is irrelevant, which it is not. The correct material is the

> prime shielding factor.

No, density is the prime shielding factor. That means metric tons per square meter is a good first order approximation.

> That is a laymen explanation for people like you. I linked you the 'half value layer' articles ... metric tons per square meter are irrelevant. Relevant is how dense the material is and what its actual properties are to 'break' or capture cosmic rays. A ton of water simply does not equal a ton of lead, even if you believe so after you got missleaded by that NASA article :)

Again, metric tons per square meter = thickness * density. That means the half-value layer should be inversely proportional to the shield's density. So if metric tons per square meter are relevant to the half-value layer, the half-value layer should be inversely proportional to the shield's density.

Did you try plotting those half-value layers against the inverse densities for concrete, steel, lead, tungsten and uranium? If you did, you'd notice that they're all close to a straight line. So metric tons of shielding per square meter is a good first order approximation.

Also, you claimed I mixed up the travel time, but you still haven't shown that my 3.5 day travel time to Mars at 0.25g is somehow wrong. What travel time did you get?

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- **Re:What will happen to their physical condition (Score:2)**

by angel'o'sphere (80593) Alter Relationship on 2014-10-06 10:52 (#48074865) Homepage Journal

*Again, metric tons per square meter = thickness * density. That means the half-value layer [nde-ed.org] should be inversely proportional to the shield's density. So if metric tons per square meter are relevant to the half-value layer, the half-value layer should be inversely proportional to the shield's density.*

Yes, on a first glance it should.
But in fact it does not. It highly depends on the material you use.

And to revert your argument: exactly all the stuff you correctly pointed out is why physicist use thickness and not weight. My point about layman, badly expressed, sorry, was: they use moon material as reference. And likely where more concerned about the total mass that involves, instead of proper arguing how to make a "perfect shield".

My point is: if you shield a reactor, mass is irrelevant, you take the cheapest per "needed" mass/volume material that fulfills the task.

In a spacecraft you likely want lowest mass ... and when we look at the moon as source, other issues like mining and launching ...

Nevertheless using the finally figured: "oh, with glass from the moon we can get it done with those masses" is incorrect for nearly every other material you can use.
E.g. glass with a low dosage of lead, weights perhaps 1% more but shield 40% better.

Also, you claimed I mixed up the travel time, but you still haven't shown that my 3.5 day travel time to Mars at 0.25g is somehow wrong. What travel time did you get?
I did not claim that. Why are people so obsessed with mixing up a simple statement, which was worded as an assumption, with a claim?
I recalculated it and you where right.
So my conclusion is that I remembered the "possible" or likely acceleration wrong. As I pointed out in another post: wikipedia (german, but left out all the calculations) speaks of 39 days, I remembered 30 days. However I was to lazy to recalculate what that implies for

acceleration :D

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Re:What will happen to their physical condition (Score:2)

by khayman80 (824400) on 2014-10-06 11:24 (#48075247) Homepage Journal

> > Again, metric tons per square meter = thickness * density. That means the half-value layer should be inversely proportional to the shield's density. So if metric tons per square meter are relevant to the half-value layer, the half-value layer should be inversely proportional to the shield's density.
>
> Yes, on a first glance it should. But in fact it does not. It highly depends on the material you use.

Again, to a good approximation, those half-value layers **are** inversely proportional to the shield's density.

I plotted those half-value layers against the inverse densities of concrete, steel, lead, tungsten and uranium. The blue squares are for the iridium source, and the red circles are for the cobalt source. Since those points lie close to a straight line, radiation absorption is determined primarily by density. So metric tons per square meter is a good first order approximation, at least for those materials.

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- **Re:What will happen to their physical condition (Score:2)**

  by khayman80 (824400) on 2014-10-06 15:00 (#48077655) Homepage Journal

  Oops, I actually plotted inverse density versus half-value layer thicknesses. This doesn't affect the conclusion, but here's a plot with a corrected file name.

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- **Re:What will happen to their physical condition (Score:2)**

  by khayman80 (824400) on 2014-10-06 15:01 (#48077661) Homepage Journal

  Oops, I actually plotted inverse density versus half-value layer thicknesses. This doesn't affect the conclusion, but here's a plot with a corrected file name.

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- **Re:What will happen to their physical condition (Score:2)**

  by Half-pint HAL (718102) Friend of a Friend on 2014-10-04 6:58 (#48062443)

  the main hazard is the sun, which is 'behind' you.

  That depends on your trajectory. The planets aren't in one straight line, remember.

  --
  Got them moderator blues I blieve I walk out the do', With these mod-points I been gettin', I 'most never post no mo'
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Re:What will happen to their physical condition (**Score:2**)

by angel'o'sphere (80593) Alter Relationship on 2014-10-04 9:42 (#48063335) Homepage Journal

Yeah, but as soon as you stop burning the engine, you can turn the ship to point the shielding to the sun. Perhaps it would make more sense to have a 'room' or the shielding itself, that can be rotated.
But I guess, as "exciting" such hibernating sounds, we are better of with a sustainable vasimir engine that allows to fly the whole way under acceleration. AFAIR it should be possible to accelerate with roughly 0.25g and reach Mars in less than 3 months.

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Re:What will happen to their physical condition (**Score:2**)

by khayman80 (824400) on 2014-10-04 16:56 (#48065411) Homepage Journal

If a VASIMR drive could sustain 0.25g acceleration, its fuel tanks would be enormous. It would also use a **lot** of power, requiring either a nuclear reactor or huge solar panels capable of supporting themselves at 0.25g.

But if it could be done, continuously accelerating at 0.25g to the midpoint then decelerating at 0.25g would result in an Earth-Mars travel time **much** shorter than 3 months. When Mars is closest to Earth, the travel time would only be 3.5 days. Even when Mars is on the other side of the Sun, the travel time would only be 9.4 days.

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- **Re:What will happen to their physical condition (Score:2)**

  by angel'o'sphere (80593) Alter Relationship on 2014-10-05 8:18 (#48068119) Homepage Journal

  Erm, are you sure you don't mix up the travel time. I guess I mixed up the possible acceleration, but I'm pretty sure the vasimir inventors talked about a travel time of 3 months.

  Anyway, the time in seconds would be calculated via: s = 1/2 a t^2. As we fly half of the way accelerating the other half decelerating, we use (2 * s) for the total. distance and solve the equation for t = sqrt [(2 * s) / (1/2 a)].

  Now insert the approximated distance as s in _meters_ and the acceleration a in meter/sec^2 and you get the result as travel time in _seconds_.

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- **Re:What will happen to their physical condition (Score:2)**

  by angel'o'sphere (80593) Alter Relationship on 2014-10-05 8:22 (#48068133) Homepage Journal

  The german wiki article is talking about a travel time to mars of 39 days, btw. But is unspecific for what kind of craft (size, weight etc.)

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Re:What will happen to their physical condition (Score:2)

by khayman80 (824400) on 2014-10-05 10:19 (#48068739) Homepage Journal

If you think I mixed up the travel time, try calculating the travel time at 0.25g from Earth to Mars when it's closest to Earth at 55 million kilometers. Again, that only takes 3.5 days.

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Re:What will happen to their physical condition (Score:2)

by rtb61 (674572) Friend of a FriendFoe of a Friend on 2014-10-03 19:02 (#48060635) Homepage

The flip side of that is toughening up the ship to provide protection between faults, emergencies, impacts and crew wake up time. How long it takes to crew to go from extended sleep to active functioning, in the movies, they always fast forward through this, likely reality is days, during which they will have to be exercising a lot to rebuild muscles.

What efficiency accept reality a place size limits on access to the space program, no taller than say 1.6m and that reduction really does make a saving in life support systems and overall size of systems.

The real constraint is how long, once you make it a really long slow trip, then the ship becomes big enough for a managed aquaponic system to provide sustenance and oxygen. Go for a long slow trip with a very large ship and conduct experiments on the way out. Likely reality is, when are going to have to based permanently on the moon before when can tackle a manned trip to mars.

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Chaos - everything, everywhere, everywhen

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I bet the human brain is a kludge. -- Marvin Minsky

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