# Cosmic Theories, Greenhouse Gases, Global Warming » Your smartphone is radioactive!

« New observational hint at max. 1.3 °C climate sensitivity

# Nuclear energy and all thinks related to radioactivity have nowadays a

bad press in Europe; few people remember their high-school physics with experiments on radioactive decay, and hopefully some information on the ubiquitous radioactive radiations that are a part of nature since the beginning of our planet. Decades of scare stories. semi-truth and abysmal lies have fostered a generation in Germany that thinks nuclear emission-free energy is outdated, and that radioactivity, where it exists, must be avoided like hell (or forbidden

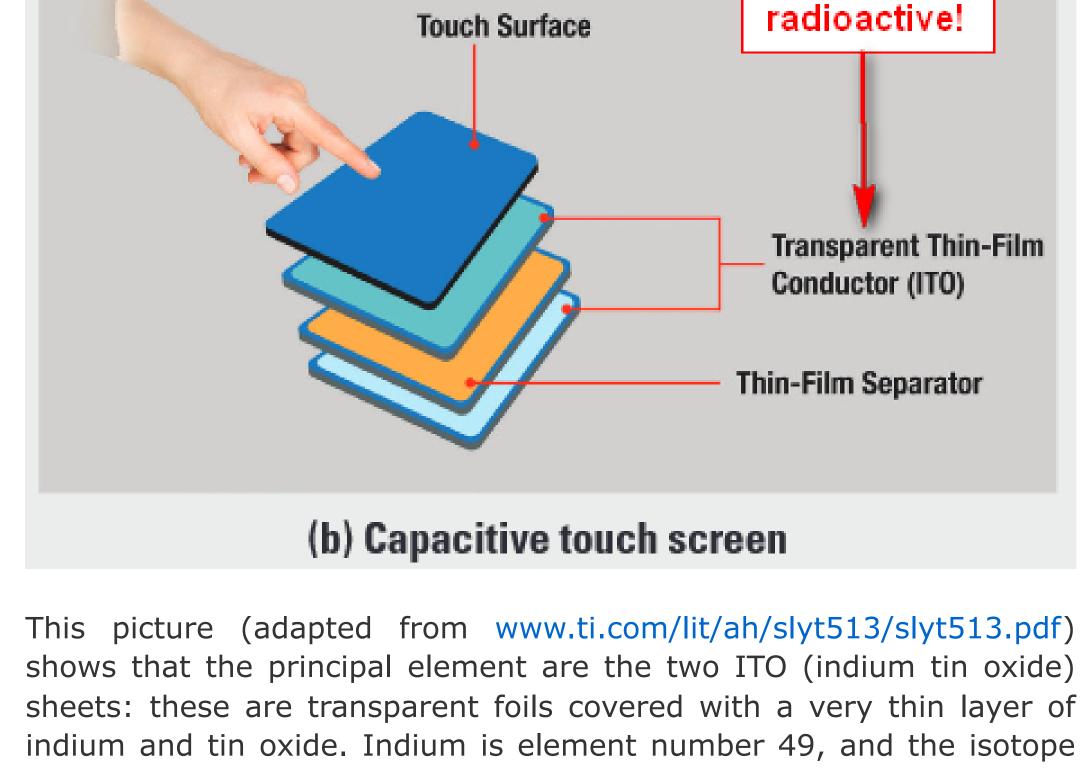
by the government :-)) It may come as a surprise that your humble smartphone that your Comment so frequently is a radioactive gadget. I learned this after read excellent article by David Jones at the website Brave New Climate.

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All smartphones and tablets use touchscreens, which are one of the principal causes for easy use.

1. The ITO touchscreen

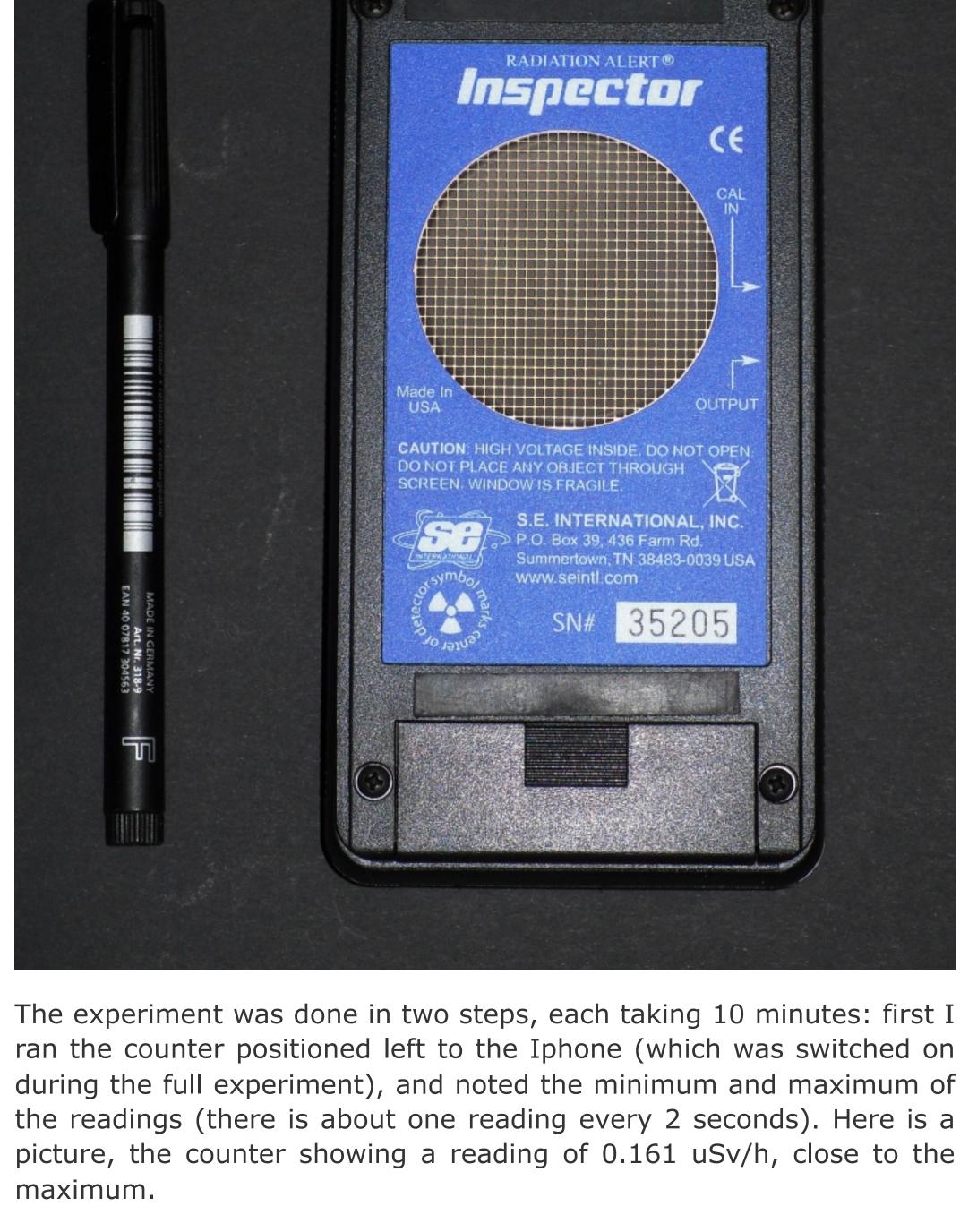


used here is the most abundant I115. This isotope is a beta- emitter (it emits electrons from its nucleus, and converts to Sn115, which is tin.) The energy of these electrons is rather small (495 keV), and the halflive of the indium is huge: 4.14\*10^14 years! Indium is the 65th most frequent metal in the Earth crust, where it is found at a very small concentration of about 160 ppb (parts per billion). The minable world reserve is estimated at 6000 to. With steady increasing use in

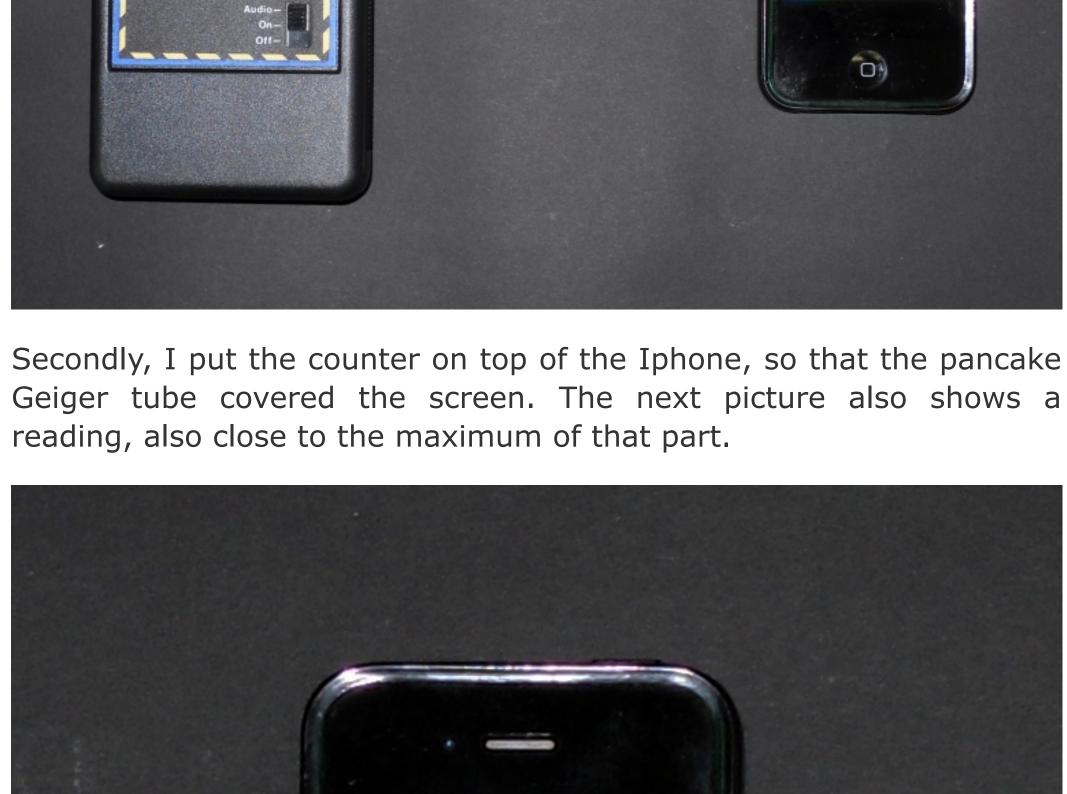
electronic devices and wind-mills, it may become a bottleneck for further development. 2. Measuring the radioactivity of an Iphone 4 Can the radioactivity of the Iphone touchscreen be detected? To answer this question, I put up a quick experiment, using a semiprofessional Geiger counter, the INSPECTOR from S.E. International. This instrument has a very large pan-cake Geiger tube of about 48mm

### diameter; this means it is very sensitive even to small radioactivity levels. The picture shows the back-side of the INSPECTOR, with the

wire mesh protecting the counter tube. RADIATION ALERT® Inspector (€



0.15 1 usv/1



[].25] <sub>uSv/hr</sub> RADIATION ALERT® mR/hr µSv/hr -CPM CPS-Total/Timer -Audio-Here the results (all in uSv/h): minimum = 0.065 Maximum = 0.167Background: On top of screen: minimum = 0.161 Maximum = 0.275 We note that the second range begins practically where the first one stops: the minimum radiation on the screen is equal to the maximum of the background, and the maximum of the screen exceeds the background maximum by 65%. If we use the mid-points between minima and maxima (116 and 218) as relevant indicators, we see that the touchscreen increases ambient radioactivity levels by **88**%! This means that the tip of your finger is exposed to about two

launch with great fanfare the non-radioactive Iphone model? Share this:

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response, or trackback from your own site. 8 Responses to "Your smartphone is radioactive!"

May 22, 2016 at 10:53 | Reply Considering that the content of Indium in LCD is 0.65-0.95 g/m^2 a cell phone has 2.4 mg of Indium in each ITO sheet for a 30 cm^2 LCD. The atomic weight of Indium is 114.8 g/mole , that means there are 2.0910^-5 mol of Indium or 1.26 10^19 atoms of Indium in each ITO sheet. The half life

maxgacode Says:

equivalent to (roughly) 0.5 decay per seconds. So the activity (total) in a single ITO sheets is 1000 times lower. The Geiger you used has a geometry factor of 30% (roughly) and a beta efficiency of 20% that means the radioactivity of a single layer is 1/15000 of the background. Your measurement is absolutely WRONG! The observed increasing of radioactivity (if any) is NOT related to Indium! References (freely available over internet): [1] Recovery of Indium from End-of-Life Liquid Crystal Displays – Industrial Materials Recycling Department of Chemical and Biological Engineering [2] http://www.chemicalelements.com/elements/in.html fmassen Says: May 22, 2016 at 21:33 | Reply

1) You are telling us that the increase of "background" is related to Indium. As I shown that is false. My calculations are very simple and any physicist

mistake please let me know)

criticism.

order of magnitude!!!!

**Michael Mann Says:** 

zero!

May 28, 2016 at 10:09 | Reply

Unfortunately for your thesis both Iphone4 and Iphone5 are using Indium Oxide touchscreen. So? My computation can be verified easily, is there any mistake? In case there are no mistake I'm expecting you to accept the Indium has nothing to do with the observed increase of counts. Your conclusion is "incorrect" by 4-5

maxgacode Says: June 2, 2016 at 11:17 | Reply Indium-115 is emitting beta with a maximum energy equal to 630 keV, so the average beta energy is about 200 keV. The LND

sensor has roughly 20% efficiency (2 pi geometry) at 200 keV.

So the geiger shuol be able to detect 20% of.....nothing (as I

shown the activity in one cell phone is to low) that is equal to

MaxGaspa Says:

June 17, 2017 at 11:29 | Reply

Michale Mann...the Inspector Alert is using a LND pancake sensor with 2 mg/cm^2 mass thickness. That means low energuybeta particle can be detected. Moreover Indium-155 is decaying emitting a 0.5 Mev beta for which the LND sensor has roughly 20% of efficiency (4 pi). anon...I wok for who? Your comment ha NO common sense. Moreover I never said your counters are wrong, I said YOUR

and study it before taking measurements. anon Says: June 13, 2017 at 17:54 | Reply using a decent amount of common sense ... the fact that you work for them inclines you to declaim as much... i have also done such measurements and

## whoah this blog is wonderful i love reading your posts. Keep up the great work! You know, a lot of people are hunting around for this info, you can aid them greatly.

times of what is the normal background radiation in Luxembourg. Should you be afraid? Yes if you have been brainwashed to believe that all radioactivity is dangerous! No if you remember your physics teacher and have kept a modicum of common sense! PS1: When the Geiger counter is put on the backside of the Iphone,

readings are similar to the background: the beta radiation does not

cross the phone's case. You may want to put your phone in the shirt

PS2: There are alternatives to the use of indium in the laboratories:

graphene, carbon nano-tubes etc. are some potential candidates.

They will most certainly be used in the future, when demand makes

Indium (now at ~800 US\$/kg) too expensive. So, when will Apple

pocket with the screen facing out :-))

X X

**F**acebook

Germany's retour

to fossil energies.

With 2 comments

September 18, 2012

Related "Gas und Kohl, Radioactivity and Ambient air uns ist wohl!" precipitation radioactivity peaks

due to

radon washout?

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This entry was posted on August 17, 2015 at 21:00 and is filed under Uncategorized.

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of Indium is 4.41 10^14 years and so the total activity of Indium is 1.26

10^19 ln(2) / HalfLife (in seconds) or 0.0006 decay per seconds (Becquerel).

The background, measured with an Inspector Alert, you are measuring is

period of ca. 10 minutes. Here the results: background: minimum = 0.077 iphone 5s: minimum = 0.071iphone 4: minimum = 0.173So indeed, the iphone 5s does not seem to create any increase, but clearly the iphone 4 does.. The maximum values for background and iphone 5s were about the same ( $\sim$ 0.221) but went up to 0.323 for the iphone 4. I do not agree that my measurements are wrong; the increased radioactivity of my iphone 4 seems real; is it due to the indium ITC or is there another cause? That is the question... maxgacode Says: May 23, 2016 at 00:27 | Reply Your measurement are incorrect (may be "wrong" is a rude term) in different way:

should be able to check the correctness in few seconds (if you think I made a

2) If your data are correct you should look for a different mechanism. Geiger

counter are prone to electrical noise, please can you repeat the measurement

In any case your measurement may show that ONE Iphone 4 is generating

counts more than ONE Iphone 5. For sure Indium is not the guilty! You are

jumping to a pre-defined conclusion (your expectation) not using scientific

with phone turned off? Far from electrical devices, neon lamps....

maxgacode, I disagree, even if your calculations seem reasonable. I remade

the same measurements today, but adding a new iphone 5s that replaces my

old iphone 4. I noted down only the minimum activity (in uSV/h) over a

is too thick/robust it doesn't take much to shield a weak beta.

A weak beta my not be measured by some Geiger counters, if the "window"

interpretation of the measurement is wrong. Your conclusion seems just like "the pigs are flying" to any decent physicist who studied the topic. Please get a decent book about radioactivity

from which came a strikingly similar outcome Joseph Kelly Says: September 25, 2019 at 03:07 | Reply

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