PANORAMA

Thomas van Flandern (1940-2009)

Dr. Thomas C. Van Flandern succumbed to colon cancer on January 9, 2009. Born in Cleveland, Ohio, Tom became fascinated with astronomy at an early age. In 1959, Tom and his friend Dennis Smith (age 17) participated in project Moonwatch in Cincinnati and set the world record for number of artificial satellites tracked during a month. Tom used his personal telescope, bought with money earned from his paper route.

Tom graduated from Xavier University in 1962, briefly attended Georgetown University in 1963 and received his PhD in astronomy from Yale University in 1969, specializing in celestial mechanics. Dr. Van Flandern worked at the U.S. Naval Observatory for 21 years and became Chief of the Celestial Mechanics Branch of the Nautical Almanac Office. It was there that I spent the summer of 1967 as an intern, working with him on lunar occultation reductions (timings of a star's disappearance and reappearance from behind the moon). Dr. van Flandern used those reductions to determine that the gravitational constant is not constant but is slowly changing over time.

After retiring from the Naval Observatory, Van Flandern served as a Research Associate at the University of Maryland Physics Department, and as a Global Positioning System (GPS) consultant to the Army Research Laboratory. He also wrote a book, *Dark Matter, Missing Planets and New Comets*, in which he introduces several controversial ideas. Most notably of his unusual theories is that the speed of gravity must propagate significantly faster than the speed of light; both comets and asteroids are remnants of an exploded planet; back-ground radiation is not caused by an expanding universe and therefore the big bang is invalid; Mars is an escaped moon of an exploded planet formerly located in the asteroid belt; and that some structures on Mars are artificial. His opinions of Mars are commonly used to marginalize Tom's better works. For instance, he successfully predicted the discovery that asteroids may have satellites, co-published peer reviewed papers on the speed of gravity with J.P. Vigier, and collaborated with Esko Lyytinen in improving the model for predicting meteor showers. The meteor shower predictions were used by me to decide what time of night was best to observe the series of Leonid meteor showers surrounding 1999.

In 1991, in response to the problem of getting research support for promising but unpopular alternative ideas in astronomy, Tom founded

Meta Research, which publishes a quarterly journal and maintains a presence on the Internet at metaresearch.org.

He is survived by his wife, Barbara, and four children.

Stephen Hawking's Explosive New Theory

In the beginning we are told that God created the firmament to divide the waters above and below the firmament. Although the view is now discredited by creationists, many still regard the firmament as the atmosphere separating the land surface from a canopy of water above it. The view runs into trouble with Scripture when it says that the sun, moon, and stars are placed inside the firmament. Modern creationist theory, as well as geocentric theory, understand the firmament to be the realm of the sun, moon, and stars that is the second heaven which separates the waters below from the waters above.

In order for the firmament to divide the waters, the waters had to start out as one mass of water. That implies that the firmament was stretched out in its creation. Indeed, the material universe we now see at night was also stretched out inside the firmament on the fourth day of creation. Thus God is said to have stretched out the heavens (plural) in Isaiah 45:12.[1] Indeed, we are also told that God is still stretching out the heavens (Psalm 104:2; Isaiah 40:22), so the expanding universe has scriptural support.

These days, stretching out the heavens is called *inflation*. The most viable version of the Big Bang is the inflationary version about which we have written many times. We have also reported that the earliest inflation model required the universe to be no more than 100,000 years old. The old-universe inflationary models have great difficulty accounting for what we observe. Now Stephen Hawking has come up with a new idea to explain how the Big Bang led to the vast cosmos that we can see today.

Modern astronomers deduce that the early universe must have expanded at a mind-boggling rate because regions separated by vast distances have similar background temperatures. A slower expansion rate consuming a larger fraction of the age of the universe would not suffer from such a problem. Nevertheless, evolutionary cosmologists are forced to propose a process of rapid expansion of neighboring regions, with similar cosmic properties, to explain inflation. But that does not explain why inflation occurred in the first place. Geocentrically we know that inflation was necessary to "age" the universe and its stars and finish it in less than a week, but that is unacceptable to cosmologists.

[1] Isaiah 45:12—I have made the earth, and created man upon it: I, even my hands, have stretched out the heavens, and all their host have I commanded.

mologists.

Last June, an answer was proposed by Prof Stephen Hawking of Cambridge University, working with Prof Thomas Hertog of the Astroparticle and Cosmology Laboratory in Paris. Hawking is best known for his attempts to combine theories of the very small (quantum theory), gravity, and the very big (general relativity) into a theory called *quantum gravity*.

According to quantum mechanics, when a particle of light travels through space, it does not take a pre-determined path but senses every possible path simultaneously. It selects the path with the least resistance. This is called the *principle of least action*. Hawking and Hertog propose the same thing for the inflationary stage of the universe.

In this theory, the universe can be described by a mathematical object called a *standing wave*. A jump rope is an example of a standing wave. So is the string on a musical instrument. What appeals to atheistic cosmologists is that such a standing wave requires no predetermined origin to the cosmos. Instead, the wave function of the universe searched out a multitude of ways to develop. Counter intuitively, Hawking and Hertog argue that the universe began in just about every way imaginable (and perhaps even some that are unimaginable). For instance, our universe consists almost exclusively of regular matter (koinomatter), but another universe may consist mostly of antimatter. Out of this profusion of beginnings, like a blend of a God's-eye view of every conceivable kind of creation, the vast majority of baby universes withered away to leave the mature cosmos that we can see today. At least, this is what the two cosmologists claim. (There is nothing "weird" about this; when one kicks a ball, the ball first feels an impulse—the introduction of the force that starts the ball's acceleration—but in the earliest stages of impulse, the ball does not yet sense the direction in which it should accelerate.)[2]

But, like any new idea, there were problems. The two discovered that they could not explain the rapid expansion, the inflation of the universe. But now, in a paper in *Physical Review Letters* with Prof James Hartle of the University of California, Santa Barbara, they report that their earlier estimates of inflation were wrong. They had not properly accounted for what we observe. Hawking and Hertog's first theory yielded "a little bit of inflation at the beginning, contradicting the observations," according to Hertog. After taking into account how the

[2] An impulse acting over time increases acceleration; acceleration acting over time increases velocity; velocity acting over time increases distance. That is how simple these complicated ideas can be. For instance, distance may be measured in miles; velocity is miles per hour; acceleration is miles per hour per hour, and impulse is miles per hour per hour per hour.

data on inflation is based on a view of a limited volume of the universe, the three researchers concluded that the wave function does indeed predict a long period of inflation.

"This proposal, with volume weighting, can explain why the universe inflated," Prof Hawking told *New Scientist*. By taking into account that we have a parochial view of the cosmos, the team has come up with a radical new take on cosmology. Interpretation? Since the universe looks geocentric while we "know" it is not, we have to assume that the rest of space, what we don't see, is different from what we do see.

The new inflationary model is not based on quantum mechanics as is the old Big Bang inflationary model. It is based on classical mechanics, what we observe today, and then packed backwards into the original fireball called the Big Bang. From arguments that are not clearly stated, the three cosmologists conclude that the universe did not have just one unique beginning and history but a multitude of different ones and that it has experienced them all. In other words, the kicked ball went in all directions or, stated in classical physics terms, the ball dented as long as it was accelerating. Since the surface of the dent reflects a multitude of directions where each "possible direction" is a line perpendicular to the surface of the dent, these three have concluded that each possible direction became a universe of its own. That is where quantum mechanics reenters the picture.

The new theory is also attractive because it fits in with string theory—the most popular candidate for a "theory of everything." String theory allows the existence of an "unimaginable multitude of different types of universes in addition to our own," but it does not provide a selection criterion among these and hence no explanation for why our universe is, the way it is", says Prof Hertog. "For this, one needs a theory of the wave function of the universe." And now cosmologists have one. The next step is to find specific predictions that can be put to the test, to validate this new view of how the cosmos came into being.

I suggest they look at the universe's gravitational field centered on the earth. That provides a single, specific, unambiguous solution in which all the other "possibilities" are reduced to fiction.

Radiation Death in the Van Allen Belts[3]

I am still criticized, even by people I think should know better, for not believing that the moon landings were an elaborate, bungling fraud. My stance has not changed since July 1969 when Fidel Castro first

[3] The information used in this article came from the Bad Astronomy and Universe Today web site: http://www.bautforum.com/conspiracy-theories/8643-van-allen-belt.html.

claimed the landing was a hoax: I have yet to see convincing evidence, evidence that would hold up in court, that the landings were a hoax. In this report we look at the radiation dangers of the Van Allen belts.

There are two broadly-defined Van Allen belts, an inner and an outer. The inner belt consists of energetic protons, energetic electrons, and alpha particles. The outer belt consists primarily of energetic electrons.

During the Apollo missions, the passage through the significant parts of the Van Allen belts took about four hours (2 hours out, 2 hours back). But since the intensity of the radiation was different at each point along the path, it's difficult to use that figure to arrive at an analytical estimate of exposure.

Shielding against alpha particles is trivial. A sheet of cardstock typically does the trick. Shielding against energetic protons is rather easy since these are heavy particles that do not penetrate most solid materials except at very high energies. Shielding against electrons is more difficult, but is best accomplished by non-metallic materials. There is not as great a need to shield against electrons, however, since their biological effect is limited compared to that of the heavier particles.

The "5 inch thick lead lining" is needed for gamma radiation which is composed of electromagnetic waves, not particles.

The following information was gleaned from two universities that have no tie to NASA.

The Van Allen Belt(s) are two crescent shaped belts of radiation orbiting the earth's equator in a torus that varies in intensity dependant upon the 11-year solar flare cycle. At the peak of the solar cycle, when sunspots are at a maximum, a third ring may form. It lies even closer to earth, under the region of the first permanent belt.

Now to consider an x-ray machine. Total radiation exposure on X-Ray machines is about 10 millirems for a one-second exposure, $1/200^{th}$ of the ridiculously low Federal limit of 2 rems per year. Even considering that natural production of radiation is usually about ten times more efficient then artificial, the Van Allen belt doesn't come near to the power levels to generate any lethal dose of radiation. It took the astronauts about an hour to cross through each belt. The total energy their ship would have been exposed to in the larger belt would be 0.000146 watt hours. Given that not all this energy is in the form of ionizing radiation (x-rays and gamma rays), at worst, the astronauts were exposed to less then 0.1 millirems a second, which amounts to 360 millirems for the hour to pass through one belt. A person living in high altitudes such as Denver receives about 330 millirems a year from natural radiation.

In essence, the larger Van Allen belt exposed the astronauts to about a year worth of high altitude radiation in one hour's time. Not that major of a deal, considering it takes 500,000 millirems (500 rems) to approach guaranteed lethal levels. A dose of 100,000 millirems has a 50-50 chance of making you sick, but with a 100% chance of recovery. The astronauts would have to stay in the Van Allen belts for 1,388 hours or 58 days to receive a 500-rem lethal dose. Now consider these three things: first, the above analysis does not take the spacecraft's shielding into consideration and second, it is typical for a cancer radiation dose to reach 6 million millirems, thirty times the lethal whole-body dose and third, the Federal whole-body exposure limit was 25,000 millirems prior to 1950; the yearly limit for astronauts is also 25,000 millirems.

In light of this analysis, it is clear that there is no substance to the moon-landing-is-a-hoax advocates' argument that passage through the van Allen belts would have killed all the astronauts.

Cosmic Rays at a Space-age High[4]

"In 2009, cosmic ray intensities have increased 19% beyond anything we've seen in the past 50 years," says Richard Mewaldt of Caltech. "The increase is significant, and it could mean we need to rethink how much radiation shielding astronauts take with them on deep-space missions."

The cause of the surge is solar minimum, a deep lull in solar activity that began around 2007 and continues today.[5] Researchers have long known that cosmic rays go up when solar activity goes down. Right now solar activity is as weak as it has been in modern times, setting the stage for what Mewaldt calls "a perfect storm of cosmic rays."

"We're experiencing the deepest solar minimum in nearly a century," says Dean Pesnell of the Goddard Space Flight Center, "so it is no surprise that cosmic rays are at record levels for the Space Age."

Galactic cosmic rays come from outside the solar system. They are subatomic particles--mainly protons but also some heavy nuclei--accelerated to almost light speed by distant supernova explosions. Cosmic rays cause "air showers" of secondary particles when they hit Earth's atmosphere; they pose a health hazard to astronauts; and a sin-

[4] This article is a press release by NASA dated 9/29/2009.

[5] The cosmic rays influence our weather. During eras of cold the more cosmic rays hit the earth than during warm times. At present, there is a complete absence of sunspots on the sun. Sunspots cause solar storms, which increase the sun's shielding of earth against cosmic rays. For details on the mechanism, see Bouw, G. D., 2009. "The Sun's Effect on Climate," *B.A.* **19**(128):37.

gle cosmic ray can disable a satellite if it hits an unlucky integrated circuit.

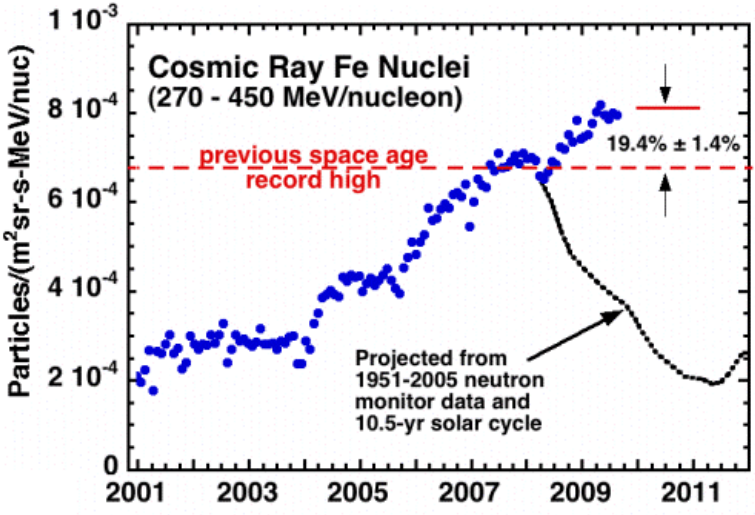


Figure 1: *Energetic iron nuclei counted by the Cosmic Ray Isotope Spectrometer on NASA's ACE spacecraft reveal that cosmic ray levels have jumped 19% above the previous Space Age high.*

The sun's magnetic field is our first line of defense against these highly-charged, energetic particles. The entire solar system from Mercury to Pluto and beyond is surrounded by a bubble of magnetism called "the heliosphere." It springs from the sun's inner magnetic dynamo and is inflated to gargantuan proportions by the solar wind. When a cosmic ray tries to enter the solar system, it must fight through the heliosphere's outer layers; and if it makes it inside, there is a thicket of magnetic fields waiting to scatter and deflect the intruder.

"At times of low solar activity, this natural shielding is weakened, and more cosmic rays are able to reach the inner solar system," explains Pesnell.

Mewaldt lists three aspects of the current solar minimum that are combining to create the perfect storm:

> **1. The sun's magnetic field is weak**. "There has been a sharp decline in the sun's interplanetary magnetic field down to 4 nT (nanoTesla) from typical values of 6 to 8 nT," he says. "This record-low interplanetary magnetic field undoubtedly contributes to the record-high cosmic ray fluxes."

2. The solar wind is flagging. "Measurements by the Ulysses spacecraft show that solar wind pressure is at a 50-year low," he continues, "so the magnetic bubble that protects the solar system is not being inflated as much as usual." A smaller bubble gives cosmic rays a shorter-shot into the solar system. Once a cosmic ray enters the solar system, it must "swim upstream" against the solar wind. Solar wind speeds have dropped to very low levels in 2008 and 2009, making it easier than usual for a cosmic ray to proceed.

3. The current sheet is flattening. Imagine the sun wearing a ballerina's skirt as wide as the entire solar system with an electrical current flowing along its wavy folds. It's real, and it's called the "heliospheric current sheet," a vast transition zone where the polarity of the sun's magnetic field changes from plus to minus. The current sheet is important because cosmic rays are guided by its folds. Lately, the current sheet has been flattening itself out, allowing cosmic rays more direct access to the inner solar system.

"If the flattening continues, we could see cosmic ray fluxes jump all the way to 30% above previous Space Age highs," predicts Mewaldt.

Earth is in no great peril. Our planet's atmosphere and magnetic field provide some defense against the extra cosmic rays. Indeed, we've experienced much worse in the past. Hundreds of years ago, cosmic ray fluxes were at least 200% to 300% higher than anything measured during the Space Age. Researchers know this because when cosmic rays hit the atmosphere, they produce an isotope of beryllium, ^{10}Be, which is preserved in polar ice. By examining ice cores, it is possible to estimate cosmic ray fluxes more than a thousand years into the past. Even with the recent surge, cosmic rays today are much weaker than they have been at times in the past millennium.

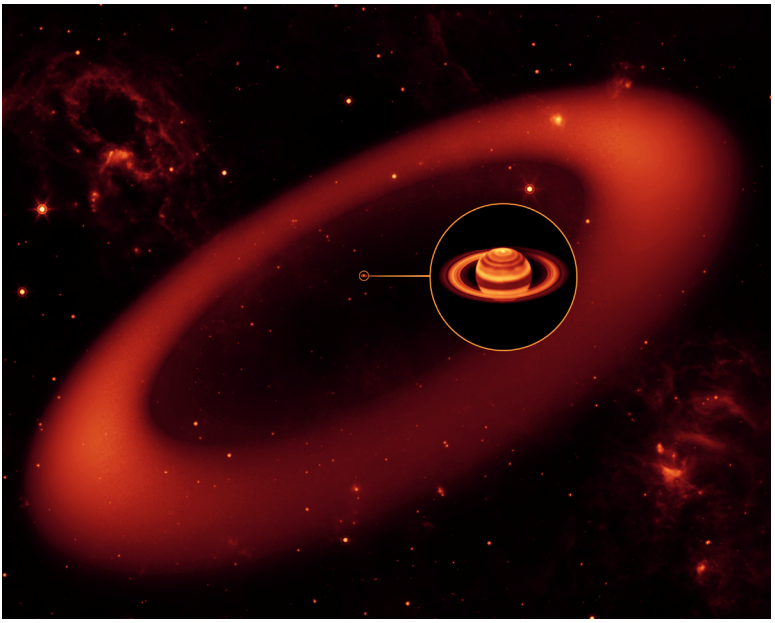
"The space era has so far experienced a time of relatively low cosmic ray activity," says Mewaldt. "We may now be returning to levels typical of past centuries."

In plain English, global warming has ceased and a century's worth of warming has been wiped out in one year.

A New Ring of Saturn Solves an Old Mystery

An outer ring of Saturn, inclined to its inner ring, has been discovered. It is depicted in the figure above, which also shows the relative position and orientation of Saturn, greatly enlarged, which fits in

the small circle pointed to by the line connecting the insert to its corresponding location.



The newly discovered ring is coupled with Iapetus' orbit in such a way that Iapetus plows through the ring each orbit with the same side catching the ring's dust. This appears to solve the centuries-old mystery of why one hemisphere of Iapetus is much darker than the other hemisphere (see front cover photo).

"The most terrifying words in the English language are: I'm from the government and I'm here to help."

—Ronald Reagan

"The trouble with our liberal friends is not that they're ignorant; it's just that they know so much that isn't so."

—Ronald Reagan

"No arsenal, or no weapon in the arsenals of the world, is as formidable as the will and moral courage of free men and women."

—Ronald Reagan