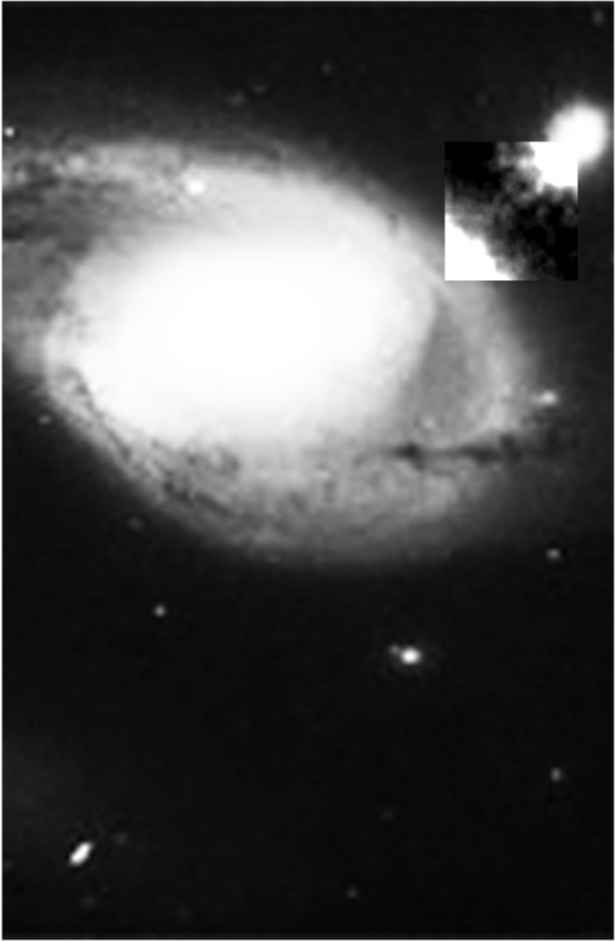


# Meta Research Bulletin

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## IN THIS ISSUE

- ⊕ The cover photos feature objects that are the subject of astronomy news stories in this issue. On the left is a photo of post-outburst Comet Holmes, taken on 17 November 2007 by Curtis Roelle, a 54 second exposure at F8 with ISO 1600. On the right is a Hubble Space Telescope photo of low-redshift galaxy NGC4319, with high-redshift quasar Markarian 205 in the same field of view. The rectangular box was contrast-adjusted to allow the low-surface-brightness bridge connecting the two to be seen.
- ⊕ Sign-ups for our international “Crisis in Cosmology – 2” conference from 2008 September 7-11 in Port Angeles, WA are proceeding briskly. Both participants and observers are encouraged to register early, because hotel space may be at a premium by this summer. See <http://www.cosmology.info/2008conference/>. We’d like to have a strong turnout of Meta Research Members.
- ⊕ It has been some time since we have recommended a book, but a new publication by Hilton Ratcliffe seems to qualify for such a recommendation. Our first article contains several reviews of the book.
- ⊕ The second news story is about the NASA *Messenger* mission to planet Mercury together with predictions that Meta Science makes. Those predictions are based on the fission hypothesis’s implication that Mercury is an escaped moon of Venus rather than an original planet.
- ⊕ The third article is about the surprise outburst of Comet Holmes in October 2007 – the largest comet outburst on record! Meta Science tells us it is no coincidence that Jupiter changed the orbit of the comet during its last revolution, giving it a new, lower perihelion. That in turn allowed the Sun to disturb a few loosely bound satellites of the comet, with some escaping and at least one hitting the nucleus. The ensuing impact explosion then sent millions of tons of dust into an expanding plume.
- ⊕ *Meta Science in the News* features a potpourri of two dozen major astronomy news stories of the year, in part to compensate for the discontinuation of our popular *Meta-notes by E-mail* (EME) series. We first give a summary of the news story as it was presented, and often ignored, from a mainstream perspective. Then, where relevant, we give the interpretation of the same data in Meta Science. These articles are arranged in rough order of Earth outward, first through the solar system, then out through the Galaxy to the universe as a whole. Collectively, these stories imply needed revolutions in our understandings of Earth geological history, what powers the Sun, how planets and moons are formed, what asteroids and comets are made of and where they come from, the possibilities for life elsewhere, and much about the nature, structure, and scale of the universe as presently interpreted.

## Book Review: *The Virtue of Heresy*

Author: Hilton Ratcliffe. Publisher: AuthorHouse UK Ltd (2007). Recommended for all dissident scientists and those interested in Meta Science. Here are a few reviews:

"*The Virtue of Heresy: Confessions of a Dissident Astronomer* by a South African physicist, mathematician, and astronomer - Hilton Ratcliffe - will hopefully mark the beginning of the end for the irrational myths and dogmas that have plagued the physical sciences since the end of World War II. Ratcliffe's book is a bombshell for the smug community of astronomers, cosmologists, astrophysicists, particle, and theoretical physicists that have controlled research funds, publications, and access to large research facilities and telescopes since the atomic bomb ended WWII, producing illusions of self-importance among the 'fathers of the nuclear age.' *The Virtue of Heresy* demystifies science - from the far reaches of the heavens to the subatomic particles in the nucleus. This book is an inexpensive, spirited, and pleasant way to experience the excitement of astronomy, physics, chemistry, space and nuclear science without wading through all the post-WWII nonsense that has driven student interest in physical sciences to an all-time low. I give this book my highest recommendation. Thank you, Hilton, for having the courage and the literary talents to bring the scientific community the possibility of a return to sanity." Oliver K. Manuel, Emeritus Professor of Nuclear Chemistry, University of Missouri, <http://www.omaturn.com>.

"*The Virtue of Heresy* is nothing less than a rip-snorter. It's rather fat for a paper back - more than 400 pages - and I found I could hardly put it down once started. What makes it so enthralling is the sort of progressive narrative style with the occasional disruptive hiccup where the thread changes to something else and the author leaves you to stew for a while. All the time he guilelessly feeds you stuff that runs counter to the science we've long learned as fact. It also illustrates the extremes to which establishment figures will go in defense of the indefensible." Dr. Geoff Stapleton, physicist specializing in climate and global warming.

"Throughout history (particularly in the religious arena) heresies have been punished by immolation, excommunication or at least banishment. Rather extreme when one considers that heresy simply means holding an 'opinion contrary to accepted doctrine' (OED) and comes from the Greek meaning 'choice'. Theoretical physics and religion may have something in common in that both seem to expect one to believe that which cannot be seen. Expounding their Big Bang, String and Membrane theories using complex mathematics, physicists would appear to stop just short of volunteering: 'Well - maybe God did it with a magic wand.' Astrophysicist Hilton Ratcliffe takes us on a journey through the annals of physics examining these theories and how they were formulated. He proceeds to dissect them and offer alternatives in his quest for 'Reality Physics'. He says: 'Start with what you can see and go forward from there.' *The Virtue of Heresy* is a fascinating read. The intricate discourse of the physicist is elegantly interspersed with some wonderfully descriptive passages, a few personal anecdotes and a conversation or two with the intriguing Mr Haquar. I am no rocket scientist and I found it to be very readable and intellectually stimulating." Margie Jameson, high school teacher and amateur astronomer.

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**“But what ... is it good for?”** – Engineer at the Advanced Computing Systems Division of IBM, 1968, commenting on the microchip

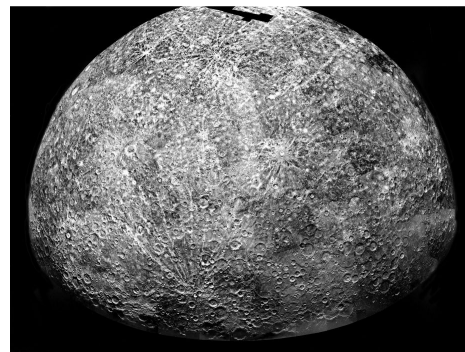
## Predictions for the Mercury *Messenger* Mission

Tom Van Flandern

Meta Research / <[tomvf@metaresearch.org](mailto:tomvf@metaresearch.org)>

NASA's *Messenger* mission to Mercury will make the first of three fly-bys on 2008 January 14. It will eventually go into orbit around Mercury in 2011. But even this first fly-by may start to answer some of the mysteries surrounding Mercury. An article in *New Scientist* 2008/01/05-11:24-27 describes six of these mysteries.

1. “Was Mercury once twice the size?” That is one theory to explain its high, Earth-like density. But fission theory tells us that Mercury originated as a moon of Venus, just as our Moon fissioned from Earth. (See additional story in accompanying news articles.) The smaller mass of Venus as compared with Earth caused Venus to lose its light elements more rapidly, producing a quicker contraction and spin-up to the point of fission. As that over-spin condition was approached, the still-very-molten Venus's heavy elements were forced to its surface, resulting in an earlier fission of a larger fraction of its mass consisting of more heavy elements, as compared with Earth and its Moon. The latter pair fissioned after the heavy elements had already sunk to Earth's core and the deep mantle had solidified. So fission theory answers “no” to this first mystery, but “yes” to Mercury having an iron core.
2. “Why does Mercury have a magnetic field?” Although its field is only 1/1000 of Earth's field, core-dynamo theories expected that Mercury's core should have solidified long ago and should no longer have such a field. Fission theory indicates that other heavy, radioactive elements should accompany the iron, keeping it hot and molten. So fission theory says the field originates in the mainly iron core and continues to exist because of plenty of uranium.
3. “What does the far side of Mercury look like?” Mainstream theory expects the so-far-unseen 56% of Mercury's surface to resemble the 44% seen by NASA's *Mariner 10* spacecraft. (See photo.) But the exploded planet hypothesis expects a hemispheric dichotomy, similar to that seen on our Moon and other solar system bodies. One hemisphere will be more mountainous, and the other will have mare-like lava flows, similar to Earth's Moon.



4. “Does Mercury have polar ice caps?” If these are water-ice, mainstream theory suggests the water must have come from comets yet managed to survive for a large fraction of the solar system’s lifetime. The exploded planet hypothesis tells us that the source of all comets still in the solar system was an explosion just 3.2 million years ago, making the survival problem three orders of magnitude easier.
5. “Why is Mercury’s orbit so tilted?” Fission theory indicates that Mercury originally made close approaches to Venus for a while after its tidal escape from Venus. These would have pumped up the eccentricity, and subsequent evolution would exchange some eccentricity for increased inclination, leading to the present orbit. This process was described and tested in “A dynamical investigation of the conjecture that Mercury is an escaped satellite of Venus”, T.C. Van Flandern and R.S. Harrington, *Icarus* 28:435-440 (1976).
6. “Is there physics beyond Einstein?” *Messenger* will probably not be able to detect small deviations from general relativity, but a follow-on spacecraft planned for 2013 may. Deviations in perihelion advance predicted by “pushing gravity” require two comparable masses to see, so Mercury and the Sun are not a suitable pair for that test. But perhaps conditions might be favorable to seeing a very small gravitational shielding effect similar to the anomalous acceleration seen in Lageos spacecraft.

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***“Flying is the second greatest thrill known to man... Landing is the first!” – Anonymous***

## **The Great Comet Holmes Outburst of 2007**

Sources for this story: “Obscure comet brightens suddenly”, Joe Rao, <http://space.com> for 24 October 2007; “What happened to Comet Holmes?”, J. Kelly Beatty, <http://www.skyandtelescope.com/news/11372856.html> for 15 November 2007; “Dazzling comet outburst continues to mystify”, *New Scientist*. [Communicated first by Boris Starosta and Don Jewett.]

Comet Holmes was discovered in 1892 by Edwin Holmes in London England. It is a Jupiter-family comet with a period a bit less than 7 years and a nucleus about 3 km in diameter. In mid-October this year, the comet was magnitude 17, visible only in fairly large telescopes. Then almost overnight, it shot up to magnitude three, easily visible to the naked eye as a faint, fuzzy “star” in the constellation Perseus. (See left photo on cover of this Bulletin issue.) The brightness change was a factor of about half a million. No tail was visible during the outburst, while the coma expanded at a rate of about half a kilometer per second. Zdenek Sekanina estimates that 100 million tons of dust were released in this event – about 20% of what was ejected in the 1980 Mt. Saint Helens eruption. The comet had reached its perihelion outside the orbit of Mars in May 2007, and has been receding from the Sun since then. Although explosive outbursts by various comets have happened before (one of them a double outburst by Comet Holmes in 1892,

leading to its discovery), this is the largest such outburst event for any known comet. The cause and energy source powering these outbursts remains unknown to mainstream astronomers. It is not even clear if the energy comes from within or outside the comet.

It is very unlikely the comet was struck by an asteroid. For one thing, the 19° orbital inclination keeps it away from the main asteroid belt. The probability of collisions in space is very low, and three collisions would be needed to explain the three outbursts Comet Holmes has had. Another possibility is collision with satellites orbiting the nucleus, which was first proposed by Fred Whipple in 1984, not long after our article about comets having satellites first appeared in print. ["Do comets have satellites?", T. Van Flandern, *Icarus* 47:480-486 (1981).] But the preferred mainstream explanation is repeated warmings by the Sun causing a dusty, ice-free "crust" to form on the nucleus, sealing the interior. Over time the pressure beneath this seal would steadily grow as ice became gas, eventually resulting in an explosion.

One clue about why outbursts occur at some apparitions but not others was mentioned by Gary Kronk: "The comet's orbit was altered by Jupiter during December 1908 so that the perihelion distance increased from 2.12 AU to 2.34 AU. The comet was lost until 1964 and it remained faint during that apparition. An approach to Jupiter during April 1968 decreased the perihelion distance back to 2.16 AU, but no outbursts were observed at any apparition between 1972 and 2000. Another approach to Jupiter in January of 2004 decreased the perihelion distance to 2.05 AU, [followed by] an outburst at the very next apparition."

In Meta Science, the EPH tells us that the nucleus is a rock covered by a thick dust regolith (material decayed from orbit) – a rock that is not active in any way that might cause jets or eruptions. It is surrounded by a debris cloud of dust and larger explosion fragments that we call "satellites". In the mainstream's dirty snowball model, the nucleus is the only mass available to produce such an event, which is why they are called "giant outbursts" and thought of as caused by internal processes.

In the EPH's satellite model for comets, the large masses in orbit around the nucleus (also seen for Comet Shoemaker-Levy 9, where 21 large "fragments" impacted onto Jupiter) are abundant enough for tidal forces to occasionally bring one or two of them down. This can happen in the months or first few years immediately following a perihelion passage, when the Sun disturbs loosely bound comet satellite orbits. A perihelion passage that is at a new low for distance from the Sun (or a planet) is a time when this is especially prone to happening. And as we noted above, that was exactly what had happened to Comet Holmes not long before this outburst.

Note that all the elements of this explanation were already in place in the EPH's satellite model for comets. Nothing new had to be added for this explanation. The only challenge-type objection raised to date is that satellites can't travel at 0.5 km/s, the expansion speed of the dust cloud. However, impacts produce both craters and dust eruptions by exploding, not by excavation. And 0.5 km/s is a reasonable dust cloud expansion speed following a satellite impact explosion. Meanwhile, the mainstream's dirty snowball model would be hard-pressed to specify any particular source for these

"giant outbursts" without them sounding like comet volcanoes, which would be totally at odds with the primitive, low-density, icy nature of comets that model requires.

For the interest of our readers, we include here an exchange on this subject that appeared on the Cambridge Conference Network (CCNet) (<http://www.staff.livjm.ac.uk/spsbpeis/CCNet-homepage.htm>) in November 2007, issues #177 through #181, operated by Benny Peiser.

#### TAKING THE MYSTERY OUT OF THE COMET HOLMES OUTBURST

Tom Van Flandern, Meta Research (tomvf@metaresearch.org)

Benny,

Your reprinted article from the Baltimore Sun in CCNet 177/2007 of 1 November touts the recent Comet 17P/Holmes outburst as a "cosmic mystery", and quotes Brian Marsden saying "This is really a remarkable event" and "I've never seen anything like it" and "We're at a loss" [to explain the explosiveness of the outburst]. However, it is a mystery only to those fixated on the "dirty snowball" comet model and who, for whatever reason, ignore viable competitive models.

In particular, the satellite model for comets (originally published in "Do comets have satellites?", *Icarus* 47, 480-486, 1981) proposes that comets and certain asteroids are basically identical objects with a common origin in the explosion of a major solar system body 3.2 million years ago. Large debris fragments hurled from the explosion each gravitationally capture other co-moving debris of all sizes right down to dust. This means all comets and asteroids start out rich in satellites. For comets, some of those are removed by collisions or by tidal processes, with many ending up as boulders on the surface accompanied by a thick dust regolith. For asteroids, the same is true, with the smaller dust particles and volatiles comprising the coma also removed by solar baking because of their long-term proximity to the Sun. Like asteroids, comets are basically rocks, not dirty snowballs.

Evidence supporting this scenario has been published repeatedly, with the latest comprehensive review article out just a few months ago: "The challenge of the exploded planet hypothesis", *Int'l J. AstroBio.* 6, 185-197 (2007). Those without access to the journal can find a preprint at <http://metaresearch.org/publications/bulletin/2006issues/1215/Mrbo6dp3.asp>. The same model has also had an outstanding prediction success record, the latest being its predictions for the "Deep Impact" mission in 2005, which sent a probe into Comet Tempel 1. See "Deep Impact prediction", CCNet 83/2005 - 29 June (2005).

As for Comet Holmes, its outburst is probably greater than any previously seen, but not by so much as was implied. Comet Halley had a sudden 6-magnitude outburst at a distance of 2 billion km from the Sun in 1991. Comet 29P/Schwassmann-Wachmann 1 experiences one or more outbursts in brightness nearly every year, some of them as great as 7-8 magnitudes, despite a fairly circular orbit out near Jupiter's distance from the Sun.

Such major outburst events are a natural occurrence in the satellite model for comets because there is a large supply of candidate satellites vulnerable to tidal decay or gravitational disruption, especially in the months or years following a perihelion passage or close approach to a planet. And when these satellites impact the comet primary nucleus, there is a thick dust regolith available for ejection. Even the meter-size probe that impacted Comet Tempel 1 in the 2005 mission stirred up so much dust that it obscured the ability of the passing spacecraft to photograph the comet's post-impact surface.

Your CCNet article from the Baltimore Sun also mentioned that the late comet expert Fred Whipple once theorized that Comet Holmes might have had a satellite that crashed into it in 1892, causing that year's odd flare-up. But Brian Marsden dismisses that, saying "But even if he were right then, that satellite is long gone. And yet the same thing has happened again, and at the same, outbound leg of Holmes's orbit." We can readily see that, in the satellite model for comets, no such limited supply of satellites is applicable.

We even have a precedent for numerous kilometer-sized satellites from a single comet nucleus. Comet Shoemaker-Levy 9 "broke up" into 21 large "fragments" that impacted Jupiter in 1994. This was another mystery for the dirty snowball model because the tidal forces from Jupiter responsible for breaking up this multi-kilometer nucleus had roughly the strength of a puff of breath as needed to disperse a bit of cigar ash. But the satellite model gives us a more plausible picture. The "fragments" were independent satellites in orbit around the primary nucleus. Then when the comet first approached Jupiter closely, the satellites escaped into the comet's orbit around Jupiter as the comet's own gravitational sphere of influence shrunk in competition with Jupiter's gravity. There was no nucleus break-up.

Note that all the elements of these explanations from the satellite model for comets were already in place before being applied to any of these comets. Nothing new had to be added. Meanwhile, the dirty snowball model does not dare attempt a specific mechanism for these "giant outbursts". Any such mechanism operating on the primary nucleus would be the energy equivalent of a "comet volcano" and at odds with the primitive, low-density, snowball nature of comets required by that model.

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#### METEORITES AS SAMPLES OF COMETS AND ASTEROIDS

Tom Van Flandern / Meta Research / [tomvf@metaresearch.org](mailto:tomvf@metaresearch.org)

Benny,

E.P. Grondine [epgrondine@yahoo.com] commented in CCNet 180 (#14) about the exploded planet hypothesis's corollary that comets and asteroids are basically the same type of rocky bodies surrounded by orbiting debris. This was at the basis of the explanation I described in CCNet 178 for the Comet Holmes outburst.

EPG: the data do not seem to support Tom's hypothesis in any way...



TVF: I am sympathetic to the limitations imposed by the medical condition Grondine mentioned, but nonetheless urge that he read the citations I provided and grasp the quantity and quality of the evidence available before taking pot shots at the idea. The main reference I provided was “The challenge of the exploded planet hypothesis”, Int’l J.AstroBio. 6, 185-197 (2007); also at <http://metaresearch.org/publications/bulletin/2006issues/1215/Mrbo6dp3.asp>. This article contains many additional citations on the subject, with over 100 lines of supporting evidence, including discussions of the same points Grondine mentions.

EPG: The comet samples [in meteorites] are very very different from the asteroid samples.

TVF: But this merely reflects very different source bodies with widely differing masses. Most asteroids sample crust and upper mantle from the explosion of terrestrial-sized parent bodies, where everything below about 40 km depth is vaporized when suddenly depressurized by an explosion. The remainder of the asteroid population and all current comets sample the interior from the explosion of Ceres-to-Moon-sized parent bodies. Present evidence suggests six planet explosions over the solar system’s 4.6-billion-year history, and an unknown number of smaller explosions, the most recent being at 3.2 million years ago.

EPG: The carbonaceous meteorites are known to have cometary sources, and besides carbon compounds these also contain calcium and aluminum...

TVF: In fact, direct samples of Comet Wild 2 from the Stardust sample-return mission showed the presence of these plus magnesium, olivine, and titanium -- high-formation-temperature minerals usually associated with volcanic outputs from deep inside planets. The mainstream is still struggling to come up with a credible explanation from this major surprise. Yet there is no mystery here if comets sample a Moon-sized parent body.

EPG: the spheres of the chondritic meteorites most likely reflect events occurring during the first condensation of our solar system...

TVF: That dating is \*assumed\* by the standard model. The only direct evidence we have of the ages of these bodies is their cosmic ray exposure ages, which are measured in millions, not billions, of years.

EPG: the iron and stone meteorites appear to most likely reflect the later break up of one or more large proto-planetary bodies.

TVF: Powerful evidence has now converged on the conclusion that there was nothing “proto” about the parent bodies. Even the oldest explosion event, the one responsible for the “late heavy bombardment”, occurred 700 million years after planet formation was complete.

EPG: there are asteroids which are carbonaceous, but these appear to simply be dead comets which have been captured in the inner solar system.

TVF: In the EPH, all asteroids are “dead comets”, meaning their volatiles have been baked away. There is still no known unique distinguishing feature between asteroids and comets. The more we have learned in this space age, the more the identities of these two classes of bodies have tended to merge. The last few close-up spacecraft images of

comets and asteroids are visually indistinguishable. This is just as the exploded planet hypothesis first suggested in “A former asteroidal planet as the origin of comets” in *Icarus* 36:51-74 (1978), at a time when asteroids and comets still seemed to have little in common.

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***“The most interesting phenomena are of course in the new places, the places where the rules do not work – not the places where they do work! That is the way in which we discover new rules.” – Richard Feynman***

## **Potpourri of “Meta Science in the News” for 2007**

With the discontinuation of our *Extended Meta-notes by E-mail* (EME) series this year (16-year collection now available on CD), we have accumulated many news-worthy stories not getting the attention they deserve. This issue just skims the surface of many such developments, most of which have the character of puzzles to the mainstream while fitting nicely into Meta Science without need of ad hoc patchwork or new free parameters. When introduced to accommodate unexpected findings, added patches and free parameters are the leading indicators of bad theories.

Most of these reports will cite the findings and mainstream interpretations of the authors, then show what the same data would mean under Meta Science premises.

### **Moon Origin: Earth’s Moon is a cosmic rarity**

A new study indicates that moons like the Earth's, which are believed to have formed in catastrophic collisions, must be rare. Such collisions would create considerable dust. But a search for the dusty signs of similar collisions around 400 very young stars of roughly the same age our Sun was when the Moon was formed turned up little evidence of such dust. This search used infrared measurements to separate heat signatures of stars from those of surrounding dust. Only 1% of the stars examined were dusty, and only one of the 400 fit the expected characteristics of a moon-forming collision. Considering all caveats, moons like our own could form in only about 5-10% of planetary systems, and possibly far fewer. In fact, the amount of debris seen around young stars doesn't fit well with the theory, and more debris is seen around older stars. [<http://news.bbc.co.uk/1/hi/sci/tech/7104558.stm>]

In Meta Science, our Moon formed the same way as all other major moons and planets, by fission from a parent body. So our Moon is no rarity at all, and no low-probability cosmic collisions are needed. Most of the dust in our present solar system is left over from relatively recent planetary and moon explosions, consistent with the observation that it is the older stars that have the dustier environments.

However, the primary problems with the “Big Whack” theory (that a Mars-size-or-larger body impacted Earth with a glancing blow and knocked off the Moon) are several, and go much deeper than the incompatibility with stellar dust signatures. Basaltic material from Earth, which is the primary ingredient in the Moon, cannot achieve orbit without a second event because its orbital trajectory following a single impact event would be an ellipse that still intersected the Earth. And once in orbit, it cannot reassemble into a Moon because bodies on similar orbits are forced to librate and avoid subsequent close approaches, while bodies on dissimilar orbits collide destructively. Moreover, all orbits would pass inside the Roche limit, wherein tidal forces would tear apart significant-sized bodies lacking cohesive strength. So the forces operating would tend to spread debris into rings, the opposite of what forming the Moon that way would require.

### **Did the Moon form from Earth?**

In another study of lunar origin, tungsten isotopes in lunar metals indicate a late formation and prolonged differentiation of the Moon. Again, the Big Whack theory was assumed. However, the timescales for formation and solidification of the Moon lead to contradictory results. Previous studies concluded that the Moon formed within 60 Myr of solar system formation. But identical  $^{182}\text{W}/^{184}\text{W}$  (tungsten) ratios indicate that the lunar magma ocean probably did not crystallize within the first ~60 Myr of the solar system. That ratio is the same for both lunar and terrestrial mantles. The identical oxygen and tungsten isotope ratios of the lunar and terrestrial mantles require either that the Moon is derived mainly from terrestrial material or that oxygen and tungsten isotopes in the Moon and Earth's mantle equilibrated through some unspecified mechanism in the aftermath of the giant impact. [*Nature* 450:1206-1209 (2007).]

In Meta Science, the results again confirm that the Earth was apparently the only parent of the Moon, and there is no hard chemical evidence for involvement of another body. The Moon's fission-origin event is not a destructive one, and need not have reset these radiometric clocks, which then measure the time from solar system formation to the Moon fission event. As long as the early, hot, over-spinning Earth was at least 8500 km in radius (as compared to 6400 km today), the fissioned Moon would be outside the Roche limit, and tidal forces would operate to compact it in the along-orbit direction. The lunar magma ocean is subsequently created by strong tidal forces on the early Moon while still in close proximity to Earth. Such forces are similar to those acting on Jupiter's moon Io today, but would have been even more intense for a time soon after the Moon's fission. As the early Moon receded from Earth through tidal friction, the magma ocean would have cooled and solidified.

This *a priori* fission scenario remains fully consistent with the idea that formation and solidification ages should be significantly different, just as observed. There is no injection problem, and the Moon does not need to capture or accrete anything once it has fissioned. There are no events of low probability in the entire scenario. And given the mathematical models for formation of Maclaurin spheroids followed by fissioning from overspin, and given how well the fission model works for many other applications, there are no events of low plausibility either.

### **H-fusion may not be the main heat source inside stars**

“A report on hot carbon stars in the 22 Nov 07 issue of Nature (<http://www.nature.com/nature/journal/v450/n7169/abs/nature06318.html>) and another report in a 21 Nov 2007 Space Ref news story (<http://www.spaceref.com/news/viewpr.html?pid=24089>) may raise awareness of a possible stellar heat source in stars other than hydrogen fusion. The surface of the Sun is 91% hydrogen and 9% helium. We are told that H-fusion in its core generates luminosity and a surface temperature near 5,800 degrees Kelvin. The study reported in Nature and Space Ref finds that stars with ‘pure carbon atmospheres’ and ‘no detectable traces of helium and hydrogen’ have much higher surface temperatures ‘between about 18,000 degrees and 23,000 degrees Kelvin’. The authors of this study suggest that carbon stars may be the cooler remains of massive stars with surface temperatures of 200,000 degrees Kelvin. However, an even higher surface temperature of 700,000 degrees Kelvin was reported seven years ago on a neutron star. (<http://www.eso.org/public/outreach/press-rel/pr-2000/pr-19-00.html>)”  
[Communicated by Oliver Manuel, <http://www.omatumr.com>.]

### **Possible asteroid impact on Mars could produce major dust storm**

A newly discovered asteroid is now on an orbit that will carry it very close to Mars on 2008 January 30, with a non-negligible chance of hitting the planet. ([http://www.examiner.com/a-1117129~Scientists\\_say\\_asteroid\\_may\\_hit\\_Mars\\_in\\_late\\_January.html](http://www.examiner.com/a-1117129~Scientists_say_asteroid_may_hit_Mars_in_late_January.html)) The chances of an impact as of this writing in early January are 1 in 25. Although an impact is still improbable, impact probabilities that high are rare, so the possibility is stirring considerable interest. The asteroid is known as 2007 WD5 and was discovered in late November. It is probably a few tens of meters in diameter, comparable to the size of the asteroid impact at Tunguska in an uninhabited part of Siberia in 1908. The energy unleashed by that event, as evidenced by flattened trees lying in circles around the impact focus point, was the equivalent to a 15-megaton nuclear bomb. But Earth’s atmosphere caused the asteroid to explode while still about 8-10 km above the surface, preventing even greater damage if the object had reached the ground intact. If the new asteroid did hit Mars, it might create a new crater up to perhaps half the size of the famous Meteor Crater in Arizona.

The most probable impact area is not too far from where the rover *Opportunity* has been exploring the Martian plains since 2004. The rover itself is not in direct danger because it lies outside the impact zone. However, Mars has so little atmosphere that the object would certainly make it to the ground at nearly full speed (~ 13 km/s), and would create a major global dust storm. So much dust in the atmosphere, combined with the decrease in available solar energy as the rovers enter the Martian winter season, has the potential to coat the solar panels on either or both rovers with dust and endanger the rovers by draining their batteries. [Story first communicated by Mitchell Swartz.]

Conventional thinking is that Martian dust storms and dust devils are created by surface winds. However, Meta Science notes that Martian winds have extremely little lifting power because the air is so thin, even when blowing at what would be hurricane speeds on Earth. And another consequence of this thin air is that even small space rocks

entering Mars's atmosphere do reach the surface and must kick up some dust, which winds would then blow about. Even the so-called seasonal dust storms may be meteor-associated. Although most impacts are from sporadic meteors and would occur at random, we now know that meteor showers, outbursts, and storms can occur on nearly the same date annually. And these would be excellent candidates to kick up some Martian dust.

Hopefully, if an impact onto Mars does happen in January or anytime soon, the expected association of meteors with dust storms on that planet will get the attention of more astronomers.

### Claims of Martian bacterial life

([http://www.resa.net/nasa/mars\\_life\\_viking.htm](http://www.resa.net/nasa/mars_life_viking.htm)) In 1976, two *Viking* spacecraft placed landers on Mars, and each operated four life-detection experiments in soil obtained by a scoop. These four were:

1. Gas exchange experiment (GEx): looked for changes in the makeup of gases in a test chamber that would indicate biological activity.
2. Labeled release experiment (LR): attempted to detect the uptake of a radioactively-tagged liquid nutrient by microbes.
3. Pyrolytic release experiment (PR): "cooked" soil samples that had been exposed to radioactively-tagged carbon dioxide to see if the chemical had been used by organisms to make organic compounds.
4. Gas chromatograph / mass spectrometer experiment (GCMS): heated a soil sample to detect organic compounds, essential to life as we know it.

Experiments	Response for sample	Response for heat-sterilized control
GEx	oxygen emitted	oxygen emitted
LR	labeled gas emitted	none
PR	carbon detected	carbon detected

As a control, the first three experiments were run both before and after the soil sample was heated enough to kill terrestrial organisms. A brief summary of the results follows:

- For the GEx experiment, oxygen was emitted, which is a biological indicator. But it was also emitted after heating, which might indicate a non-biological mechanism at work in addition to, or instead of, biological organisms.
- For the LR experiment, the labeled gas was emitted before heating, and none was emitted after heating to the highest temperatures, although some labeled gas still appeared after heating to lower temperatures that would have killed terrestrial organisms. These results are consistent with a rugged form of biology. Subsequent extensive attempts to get any similar result in a non-biological way failed.

- For the PR experiment, labeled carbon was detected before and after heating. Seven of nine experimental runs seemed to show small concentrations of microorganisms but the results were later discounted, giving the same ambiguous conclusion as the GEX experiment.
- For the GCMS experiment, an unexpectedly large amount of water was detected, but no organic compounds. This implies that biology as we know it could not be operating. However, a subsequent repetition of the test on a terrestrial sample containing a known virus also produced a negative reading, showing that the experiment was simply not sensitive enough. Unfortunately, that was not known at the time, leading to “no life” as the conclusion that prevailed. Ironically, the “extreme dryness of Mars” was cited as supporting that conclusion, contrary to what the experiment actually showed.

Now, another scientist has reanalyzed data from the GEx and PR experiments and concluded that they detected biological cells filled with a mixture of hydrogen peroxide and water. ([http://www.space.com/news/070823\\_mars\\_life.html](http://www.space.com/news/070823_mars_life.html)) The indicated density of such cells would be about one part per thousand by weight, which is comparable to what is found in some permafrost in Antarctica. But the idea was called “non-credible in view of the harsh conditions on Mars”. However, what we have learned in the past decade about organisms called “extremophiles” is that biological organisms can survive in conditions far more extreme than exist on Earth. It is proposed that the hydrogen peroxide would act like antifreeze for the cell, preventing its insides from crystallizing due to the cold. The proposed microbes might be detected by NASA's *Phoenix* lander, scheduled to arrive at Mars in May. [But it won't be looking for such organisms – Ed.] While rare on Earth, terrestrial organisms are known to use hydrogen peroxide. There does not appear to be any basic reason why hydrogen peroxide could not be used by adaptable systems if it gave an environmental advantage. While organisms on Earth have found it advantageous to include salt in their intracellular fluids, hydrogen peroxide may have been more suitable for organisms adapting to the cold, dry environment of Mars. On the other hand, hydrogen peroxide inside cells is deadly in terrestrial kinds of cells, and is one way that our cells combat bacteria, by producing hydrogen peroxide locally. [Communicated by Tim Seward.]

In summary, all *Viking* lander test results would be in agreement if the soil of Mars contained living small organisms that were resistant to being cooked at all but the highest temperatures used.

### **Dino-killing asteroid traced to cosmic collision**

[http://www.space.com/scienceastronomy/070905\\_killer\\_asteroid.html](http://www.space.com/scienceastronomy/070905_killer_asteroid.html) Science 317:1310 (2007); <http://www.physorg.com/news108218928.html>; <http://www.nature.com/nature/journal/v449/n7158/full/nature06070.html>. The collisional break-up of the Batpistina asteroid family 160 million years ago eventually led to the Chicxulub impact on Earth and Tycho crater on the Moon. [Communicated by Chuck Mauro and Raymond Chuang.]

According to a new analysis by a group at Southwest Research Institute, a chance encounter between two asteroids 160 million years ago extinguished 90% of Earth's

marine species, as well as the dinosaurs, 65 million years ago. This conclusion was based on noticing that 40-km asteroid Baptistina is accompanied by progressively smaller asteroids to either side, which is the expected pattern to result from a cloud of debris following a collision. The other Baptistina asteroid family members also share Baptistina's color, a dark reddish. The dating of the collision comes from estimating the drift of the orbits from solar radiation pressure.

Getting from the asteroid belt to Earth-crossing status is accomplished by Jupiter perturbations on Baptistina family orbits having resonances with Jupiter. Some debris could have created the surprisingly fresh craters found on asteroid Gaspra, as well as the young rayed lunar crater Tycho and the Chicxulub dinosaur-killing impact on Earth. The collision might also explain why the cratering rate for the inner solar system has doubled during the past couple of hundred million years.

Of course, in Meta Science, all these phenomena and more were already explained by the explosion of “Planet V” 65 million years ago. Especially, this explains why there are at least 16 major impact craters on Earth at or near that epoch. The Baptistina family was most likely formed in a collision, but not by simple fragmentation of the two asteroids. Instead, clouds of debris orbiting each asteroid would be released by any significant collision between Baptistina itself and a smaller asteroid, because only a velocity impulse to the asteroid of a few dozen meters per second would be sufficient to strip off all moons.

Certainly, Occam’s Razor favors the exploded planet explanation over this new idea. However, it is interesting to note how mainstream thinking is incrementally approaching the EPH scenario as its various hypotheses cope with explaining more and more phenomena that don’t fit with previous models.

### **‘Body C’ gets a name**

Those familiar with the exploded planet hypothesis and fission theory in Meta Science will also be familiar with reasons why we have concluded that Mars was one of a pair of moons that originally orbited “Planet V” near the present orbit of Mars in the inner main asteroid belt. (<http://metaresearch.org/publications/bulletin/2007issues/0315/Mrbo7ap3.asp#T1>) I have used generic names for hypothetical former planets and moons because naming tends to generate considerable controversy all by itself. However, that controversy might be avoided by following the established convention approved by the International Astronomical Union of naming major solar system bodies after characters in Greek and Roman mythology.

We have been using the generic “Body C” as the name for the other moon of Planet V that co-orbited Mars for 62 million years following the explosion of the parent planet. This second moon itself exploded 3.2 million years ago, creating one class of asteroids and all comets still part of the solar system. The obvious choice of name would then be “Bellona”, who is alternately described as the wife or sister or daughter of Mars. Whereas Mars in Roman mythology is the god of war, Bellona was the goddess of war.

And using our best inferences from the Mars anomaly evidence, Bellona appears to be the most likely home world for the builders of the reputed artificial structures on Mars.

### **Discovery of first NEO-producing meteorites**

<http://www.blackwell-synergy.com/doi/abs/10.1111/j.1365-2966.2007.12503.x>;  
CCNet 198/2007 - 28 November 2007; MNRAS (doi: 10.1111/j.1365-2966.2007.12503.x). The possible existence of meteoroid streams formed by asteroidal debris, and capable of producing meteorite-dropping bolides was proposed long ago, but evidence to support meteor streams from asteroids is scarce. The main objection of the scientific community is the very short time that such streams can avoid being scattered by gravitational and radiation pressure forces. In spite of this, the authors have found evidence for an unequivocal association between recently discovered Near Earth Object (NEO) 2002NY40 and at least one bright fireball detected over Finland in August 2006. Another fireball recorded from Spain in 2006 seems to be related to this same asteroid, and another fireball imaged from Finland seems related to NEO 2004NL8. While impacts are invoked as the physical mechanism for releasing large rocks from main belt asteroid surfaces, the relatively low number of objects forming the NEO population makes this option unlikely. [Meta Research associate Esko Lyytinen is a co-author of this report.]

In Meta Science, no collisions or rubble-pile break-ups are required to produce these streams. Just stripping off the debris cloud of satellites by a small collision or a moderate close approach would nicely do the trick. This means that meteors from NEOs will undoubtedly be more common than the mainstream models can accommodate.

### **Astronomers baffled by basalt in the outer asteroid belt**

<http://www.sciencedaily.com/releases/2007/08/070824130652.htm>. Analysis of the chemical makeup of two asteroids in the outer asteroid belt has thrown the classification system for these small bodies into disorder. The detection of basalt on the surface of two asteroids is very unusual for this part of the asteroid belt. The presence of basalt means that the asteroid must have melted partially at some time in the past, which implies that it was once part of a larger body which had internal heating processes. However, there do not appear to be other basaltic fragments in the region and, from spectral analysis, it is not clear whether the two are fragments of the same parent body or not.

Until recently, most of the known basaltic asteroids, which are classified as V-type, were thought to be fragments of Vesta, the second largest object in the asteroid belt. Since 2001, several V-type asteroids have been identified as not belonging to this Vesta family, including (1459) Magnya, the first basaltic object to be detected in the outer asteroid belt. The two asteroids (7472) Kumakiri and (10537) 1991 RY16 were selected for detailed study from a group of six candidate V-type non-Vesta-family asteroids. A shallow absorption band around the wavelength of red visible light was detected, a band never before observed in other V-type spectra. This means that these objects have a slightly different chemical composition and do not fit into any existing category of asteroid. The unexpected dip in the spectra could have two sources: it could be due to impacts with other asteroids or comets "shocking" iron-rich compounds into a

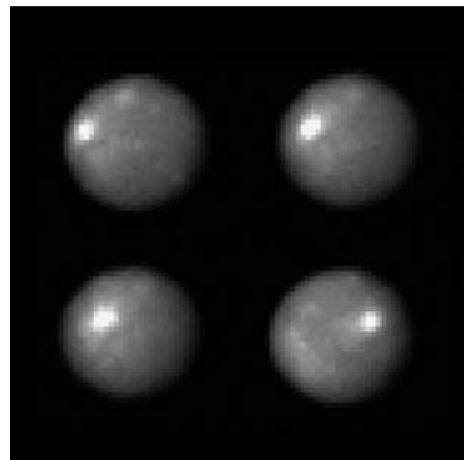


oxidized state, or it could indicate the presence of olivine – another indicator of a large parent body capable of something like volcanic processes. [Communicated by Peter Ness.]

In Meta Science, Vesta was a former moon of “Planet K”. These new asteroids might be impact debris from a twin of Vesta, because moons of Planet K should have occurred in twin pairs. Or they might simply have been too close to Planet K when it exploded. But the key point of interest is that parent bodies large enough to produce high-temperature, high-pressure minerals must have existed where the asteroid belt is presently located.

### **Evidence for the origin of Ceres as a moon of ‘Planet K’**

(<http://www.sciencedaily.com/releases/2005/09/050909073548.htm>) Hubble Space Telescope observations of 1 Ceres, the largest known asteroid, have revealed that the object may be a "mini planet," and may contain large amounts of pure water ice beneath its surface. The astronomers suspect that water ice may be buried under the asteroid's crust because the density of Ceres is less than that of the Earth's crust, and because the surface bears spectral evidence of water-bearing minerals. They estimate that if Ceres were composed of 25 percent water, it may have more water than all the fresh water on Earth. Ceres' water, unlike Earth's, would be in the form of water ice and located in the mantle, which wraps around the asteroid's solid core. See sample HST photos of Ceres as it rotates.



In Meta Science, Ceres is a former moon of now-exploded Planet K. We described this scenario near the end of our article on the “Violent history of Mars” at the following link:

<http://metaresearch.org/publications/bulletin/2007issues/0315/Mrbo7ap3.asp#T1> (before the appendices). We gave this description there:

“Generalizing this scenario’s methodology, we expect that something similar happened with former Planet K in the outer main asteroid belt. This leads to the expectation that Ceres was a former moon, and that its twin moon met the same kind of fate as Body C. So when close-up spacecraft views of Ceres become available, we expect they will show a hemispheric dichotomy and other explosion-related similarities to Mars. The lack of atmosphere would probably mean hard, melting or vaporizing impacts leaving lava-like deposits all over one hemisphere, but with no obvious source volcanoes on that hemisphere.”

### **A belt of moonlets in Saturn's A ring**

*Nature* 449:1019-1021 (2007). “The origin and evolution of planetary rings is one of the prominent unsolved problems of planetary sciences, with direct implications for planet-forming processes in pre-planetary disks. The recent detection of four propeller-shaped features in Saturn's A ring proved the presence of large boulder-sized moonlets in the rings. Their existence favors ring creation in a catastrophic disruption of an icy

satellite rather than a co-genetic origin with Saturn, because bodies of this size are unlikely to have accreted inside the rings. Here we report the detection of eight new propeller features in an image sequence that covers the complete A ring, indicating embedded moonlets with radii between 30 m and 70 m. We show that the moonlets found are concentrated in a narrow 3,000-km-wide annulus 130,000 km from Saturn. Compared to the main population of ring particles (radius  $s < 10$  m), such embedded moonlets have a short lifetime with respect to meteoroid impacts. Therefore, they are probably the remnants of a shattered ring-moon of Pan size or larger<sup>2</sup>, locally contributing new material to the older ring. This supports the theory of catastrophic ring creation in a collisional cascade.”

In Meta Science, we long ago recognized that ring stability required moonlets embedded in the rings. The idea of “shepherding” moons inside and outside rings would create odd effects not seen here, such as the corkscrew effect in the “F”-ring. This controlling moonlet possibility was predicted in our article “New Saturnian satellites?” in The Observatory 99:8-9 (1979). We now suspect that major ring-forming events occurred with the explosion of Titan’s twin and other former major moons of Saturn. These would have sent large bodies close to Saturn, eventually breaking up as a result of repeated passages inside the Roche limit. Tidal and collisional forces would evolve these inward and into circular orbits and a flat plane, producing the various major rings, each stabilized by the largest masses therein.



**Evidence for two populations of classical trans-Neptunian objects:  
The strong inclination dependence of classical binaries**

<http://arxiv.org/abs/0711.1545>; to appear in Icarus. In a search of 101 classical trans-Neptunian objects for companions with the Hubble Space Telescope, at least 21 are binary. The heliocentric inclinations of the orbits of these objects around the Sun were in the range from  $0.6^{\circ}$ - $34^{\circ}$ . A very strong anti-correlation of binaries with inclination was found. Of the 58 targets that have inclinations of less than  $5.5^{\circ}$ , 17 are binary, a binary fraction of 29%. All 17 are similar-brightness systems. By contrast, only 4 of the 42 objects with inclinations greater than  $5.5^{\circ}$  have satellites and only 1 of these is a similar-brightness binary. This striking dichotomy appears to agree with other indications that the low eccentricity, non-resonant Classical trans-Neptunian objects include two overlapping populations with significantly different physical properties and dynamical histories.

In Meta Science, asteroidal binaries are the result of an exploded parent planet, which leaves a debris cloud in orbit around every fragment of significant size. Many of these debris clouds are removed by subsequent collisions or by tidal forces, or by gravitational field instabilities in the case of very irregular shapes. Where none of these

are acting, each asteroid should still be surrounded by a debris cloud. But our ability to discover these multiple moons is limited by the lack of resolving power of our telescopes for objects so distant.

The reason for the inclination correlation is simple. Bodies from an explosion that achieve higher inclinations were ejected with higher speeds. That means the parent fragment raced ahead of the main debris cloud from the explosion, so there were fewer secondary objects accompanying it inside its expanding gravitational sphere of influence. In particular, the larger fragments tend to be given smaller ejection speeds than smaller fragments, other things being equal, because they have greater mass to cross-sectional area ratios and therefore greater resistance to acceleration by the explosion. So lower ejection speeds favor both lower inclinations and greater availability of larger fragments to become both the primary and its moons.

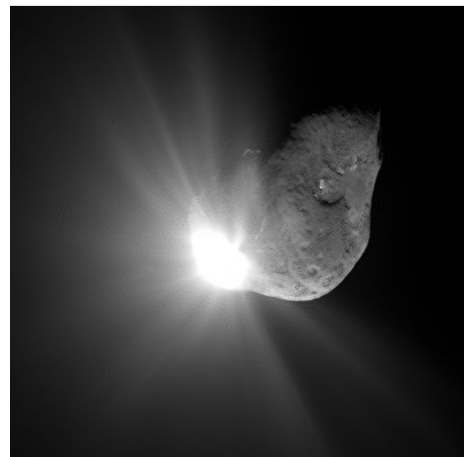
### **Formation mechanisms for Kuiper Belt Binaries**

<http://arxiv.org/abs/0709.3107>; to appear in ApJ. The discovery that a substantial fraction of Kuiper Belt objects (KBOs) [same as trans-Neptunian objects] exists in binaries with wide separations and roughly equal masses has motivated a variety of new theories explaining their formation. Two formation scenarios have been proposed. In the first, a transient binary is formed, which becomes bound with the aid of dynamical friction from the sea of small bodies. In the second, a binary is formed by three-body gravitational deflection. Formation rates for these two cases are estimated.

In Meta Science, the prediction was made nearly three decades ago, based on the exploded planet hypothesis, that minor planet moons would be “numerous and commonplace”. [“Minor planets: the discovery of minor satellites”, R.P. Binzel and T.C. Van Flandern, *Science* 203:903-905 (1979).] This prediction may now be seen as qualitatively correct. A central explosion appears to be the only way to create so many multiple systems without invoking events of low intrinsic probability. Both mechanisms described in this article are events of low intrinsic probability. Unfortunately, only relative rates between the two mechanisms were provided in the abstract, making that overall low probability less obvious.

### ***Deep Impact* on Comet Tempel 1: Take 2**

“Blowing a hole in a comet: Take 2”, NASA Science News for 2007 Sept. 26, [http://science.nasa.gov/headlines/y2007/26sep\\_next.htm](http://science.nasa.gov/headlines/y2007/26sep_next.htm). “In July 2005, NASA's *Deep Impact* spacecraft dropped an 820-pound copper projectile onto Comet Tempel 1, unleashing an explosion that made headlines around the world. Exploding comets tend to have that effect. But how many people know what happened after the blast? The surprising answer is none--not even NASA. *Deep Impact's* prime mission was to punch a hole in Tempel 1 and look inside, giving researchers their first glimpse of a comet's internal structure.



But they were never able to see the crater because the cloud of debris was so thick. Why didn't Deep Impact wait until the dust cleared? It couldn't. The mission was designed from the beginning as a high-speed flyby, giving extra velocity to the 'bullet'. Orbiting was not an option. Carried by its own momentum, *Deep Impact* sailed away before the cloud had time to dissipate.

"Take 2: NASA is going back for a second look. The plan is to send the *Stardust* spacecraft to Tempel 1 to take a second look in 2011. At first, *Stardust* was simply retired, sailing the void with nothing to do. But now it is being recycled as 'Stardust-NExT,' short for New Exploration of Tempel 1. By the time it reaches the comet, the debris cloud will be long gone and we should get a clear view of the crater.

"But there are other mysteries too. Before the dust cloud spoiled the view, *Deep Impact's* cameras saw a comet ringed by a strangely-layered 'sedimentary' terrain. There are no rivers on comets, so what causes these features? One possibility: comets might be formed in layers, perhaps created by some form of hot erosion when the comet swings past the sun every 6.5 years. Another surprise was landslides. *Deep Impact* saw an enormous flow of smooth, powdery material completely covering about a kilometer of underlying terrain. This feature is as mysterious as the layers, but it could explain one thing: why Deep Impact's debris cloud was so troublesome, for example if the projectile hit a patch of deep powder." [Communicated by Ron Baalke.]

In Meta Science, we made an unambiguous prediction that the projectile's crater in the hard surface would be small, ~20-30 m. Of course, the explosion may blast a much larger volume of loose dust away. If that dust is truly a kilometer thick, then the crater blasted will be mainly into loose dust rather than a hard surface, and will be several times larger in diameter than our prediction for a crater in a hard surface. Nonetheless, an asteroid-like hard surface lying underneath the dust, as opposed to dust or powder all the way through the comet, is the essence of the prediction. The standard model is puzzled about how there could be so much dust, especially because impacts over many millions of years should continually eject the dust because of the comet's low escape velocity. However, under exploded planet hypothesis premises, most of the dust began in the coma directly from the explosion, and later tidally decayed onto the surface only a few million years ago. The apparent sedimentary terrain is a weathering indicator, again suggestive of a planetary parent body. The dust would readily produce landslides in response to the jostling from small impacts.

### **The Pioneer Anomaly: non-existent in outer solar system**

[http://aps.arxiv.org/PS\\_cache/arxiv/pdf/0705/0705.3408v1.pdf](http://aps.arxiv.org/PS_cache/arxiv/pdf/0705/0705.3408v1.pdf). "Testing Gravity in the Outer Solar System: Results from Trans-Neptunian Objects" by John F. Wallin, David S. Dixon & Gary L. Page. "In this paper, we have presented a new method using orbital measurements of an ensemble of TNOs to measure deviations from the inverse square law of gravity in the outer solar system. The method relies on doing separate orbital fits for each object, and then characterizing the accuracy of each fit using the bootstrap technique. Since no significant systematic trends were detected in our sample, we combined the data from all the objects using a weighted average to place limits on deviations from the gravitational inverse square law in the outer solar system.

Using existing data, we have measured the deviation from the inverse square law to be  $\delta a = (0.87 \pm 1.6) \times 10^{-8} \text{ cm s}^{-2}$  directed outward from the Sun for objects at heliocentric distances of 20 to 100 au. This result is consistent with zero at the  $1\sigma$  limit. Based on our analysis of the observational data of TNOs, we find that the gravitational acceleration in the outer solar system is inconsistent with the *Pioneer* anomaly at the  $\sim 5\sigma$  level using both variations of the bootstrap analysis. All of our results were consistent (within  $1\sigma$ ) with Newtonian gravity without any additional radial perturbative forces. This suggests that the deceleration seen in the *Pioneer* tracking data was probably the result of spacecraft systematics rather than exotic physics. Even so, we cannot rule out the possibility that exotic physics is affecting the *Pioneer* spacecraft trajectories. Our work only shows that the trajectory data from the *Pioneer* spacecraft is inconsistent to what we see in large, slowly moving rocks in the outer solar system.”

### **Giant void casts doubt on current models of the universe**

[http://www.world-science.net/othernews/070823\\_void.htm](http://www.world-science.net/othernews/070823_void.htm); AP wire story on 24 August 2007; ScienceExpress [www.sciencexpress.org](http://www.sciencexpress.org), 25 October 2007; also to be published in *ApJ*. Astronomers have found the largest void yet, nearly a billion light-years across, located in the direction of the constellation Eridanus, southwest of Orion. It has an angular radius of about  $5^\circ$  and is centered on Galactic coordinates  $l = 209^\circ$ ,  $b = -57^\circ$ . This will be hard to explain in standard cosmology (although not in Meta Science) because it contradicts the expected homogeneity of the Big Bang initial fireball, and because computer simulations have difficulty reproducing it. The anomaly shows up as a cold spot in WMAP microwave temperature data and as an absence of galaxies in VLA radio telescope data. It is believed to lie 6-10 billion light years from Earth. For comparison, the nearest void is only about 2 million light years away.

The reasoning behind a void being associated with a cold spot rests on some other Big Bang premises. Without “dark energy”, rays approaching a large mass, such as a cluster of galaxies, would gain energy from the cluster’s gravity, which draws them in. As the rays leave the area, the gravity pulls back on them, sapping their energy. They wind up with the same energy that they started with. But since dark energy became dominant, rays crossing matter-rich space don’t return to their original energy level – because dark energy counteracts gravity. Thus, these photons arrive at Earth with a slightly higher energy, or temperature, than they would otherwise have. This phenomenon doesn’t occur when light rays cross a large void, so microwave radiation from a void area reaches us with less energy and appears colder. [Communicated by Chuck Mauro.]

### **Dark Matter Mystery Deepens in Cosmic 'Train Wreck'**

[http://www.nasa.gov/mission\\_pages/chandra/news/07-090.html](http://www.nasa.gov/mission_pages/chandra/news/07-090.html); NASA News release: 07-090 of 16 August 2007; *ApJ* for 20 October 2007. “Astronomers have discovered a chaotic scene unlike any witnessed before in a cosmic ‘train wreck’ between giant galaxy clusters. Chandra X-ray Observatory and optical telescopes revealed a dark matter core that was mostly devoid of galaxies, which may pose problems for current theories of dark matter behavior.

“There are three main components to galaxy clusters: individual galaxies composed of billions of stars, hot gas in between the galaxies, and dark matter, a

mysterious substance that dominates the cluster mass and can be detected only through its gravitational effects. Optical telescopes can observe the starlight from the individual galaxies, and can infer the location of dark matter by its subtle light-bending effects on distant galaxies. X-ray telescopes like Chandra detect the multimillion-degree gas.”

“A popular theory of dark matter predicts that dark matter and galaxies should stay together, even during a violent collision, as observed in the case of the so-called Bullet Cluster. However, when the Chandra data of the galaxy cluster system known as Abell 520 was mapped along with the optical data from two ground-based telescopes, a puzzling picture emerged. A dark matter core was found, which also contained hot gas but no bright galaxies. The galaxies are removed from the densest core of dark matter, which is contrary to theories of how dark matter behaves. In addition to the dark matter core, a corresponding ‘light region’ containing a group of galaxies with little or no dark matter was also detected. The dark matter appears to have separated from the galaxies.

“In the Bullet Cluster, known as 1E 0657-56, the hot gas is slowed down during the collision but the galaxies and dark matter appear to continue on unimpeded. In Abell 520, it appears that the galaxies were unimpeded by the collision, as expected, while a significant amount of dark matter has remained in the middle of the cluster along with the hot gas.

“Two possible explanations have been proposed, both of which are uncomfortable for prevailing theories. The first option is that the galaxies were separated from the dark matter through a complex set of gravitational ‘slingshots’. This explanation is problematic because computer simulations have not been able to produce slingshots that are nearly powerful enough to cause such a separation. The second option is that dark matter is affected not only by gravity, but also by an as-yet-unknown interaction between dark matter particles. This exciting alternative would require new physics and could be difficult to reconcile with observations of other galaxies and galaxy clusters, such as the aforementioned Bullet Cluster.”

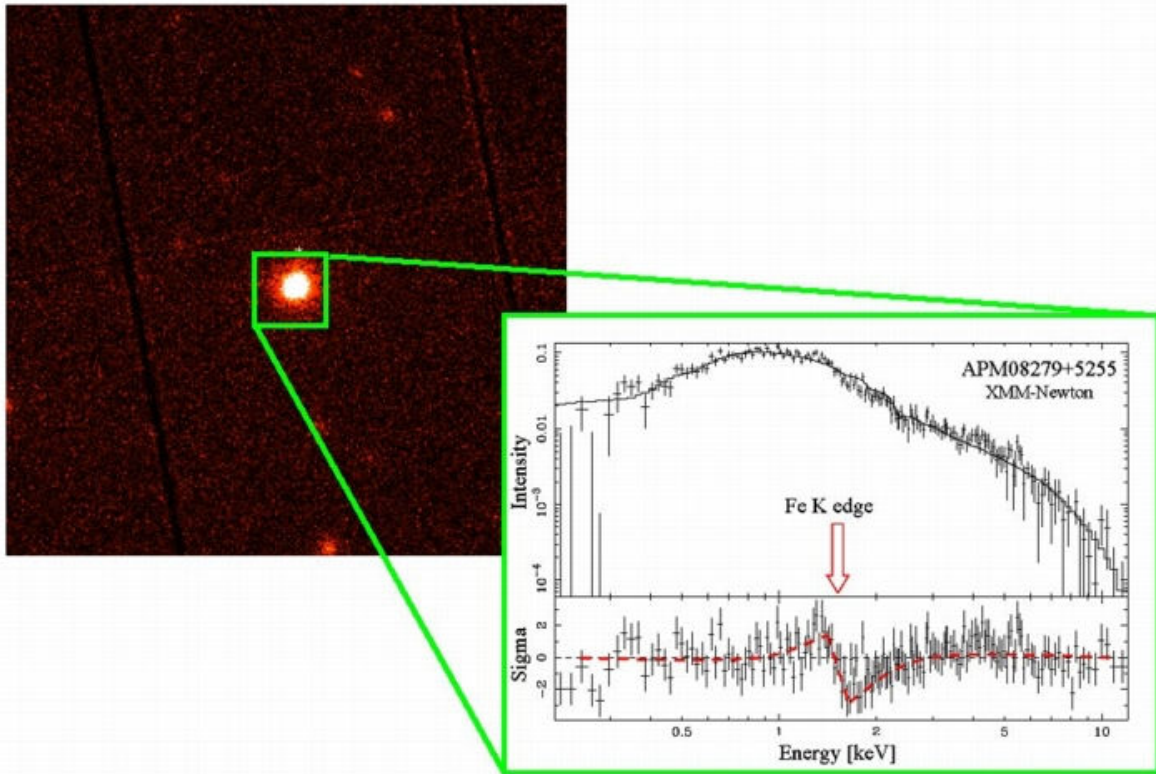
In Meta Science, there is no “dark matter”. The effects attributed to it are instead explained by a change in the inverse square character of the law of gravitation at scales larger than the mean free path of gravitons before colliding with other gravitons and being scattered.

### **Galactic Halo: Two stellar components in the halo of the Milky Way**

Nature 450:1020-1025 (2007). The halo of our Galaxy was once considered a single component. But evidence for a dichotomy has slowly emerged in recent years from inspection of small samples of halo objects. The halo is indeed clearly divisible into two broadly overlapping structural components – an inner and an outer halo – that exhibit different spatial density profiles, stellar orbits and stellar metallicities. The inner halo has a modest net prograde rotation, whereas the outer halo exhibits a net retrograde rotation and a peak metallicity one-third that of the inner halo.

In Meta Science, this represents the transition between the Newtonian inverse square gravity zone (inner halo) and the inverse linear gravity zone (outer halo).

## The Edge at the Edge of the Universe



Credit: N. Schartel/ESA/MPE

[http://heasarc.gsfc.nasa.gov/docs/objects/heapow/archive/active\\_galaxies/quasar\\_fe\\_edge\\_xmm.html](http://heasarc.gsfc.nasa.gov/docs/objects/heapow/archive/active_galaxies/quasar_fe_edge_xmm.html). “In a recent study of the X-ray emission from a very distant quasar known as APM 8279+5255, astronomers found a feature which they interpreted as absorption from iron atoms in a cloud of gas between the quasar and us. This absorption is called the iron (Fe) K edge, and it can be seen in the bottom part of the image above as a reduction in the amount of detected X-rays compared to a model of the emission. From the energy at which the edge was observed, astronomers determined that the absorbing material is near the quasar, i.e. about 13.5 billion light years from earth, so that this material existed when the universe was only a fraction of its present age. From the depth of the iron K edge astronomers deduced the abundance of iron in the absorbing medium and they were shocked to note that a huge amount of iron, about 3 times the abundance in the sun, must be present in the absorbing material. This is strange because iron is thought to be produced in the cores of massive stars, and according to conventional thinking there shouldn't have been enough massive stars to produce the observed amount of iron in the very early Universe. Either there were many more massive stars in the early universe than previously believed, or perhaps the

Universe knows of another way to make iron – or maybe the Universe is actually much older than it appears.” [Communicated by Dan Iezzi.]

In Meta Science, the redshift of the main class of quasars is intrinsic, and those objects are relatively nearby supermassive stars or Galaxy cores. So a high iron abundance is not at all surprising. Moreover, the universe is infinitely large and infinitely old.

### **Reports from the Alternative Cosmology Group newsletter**

Editor Brendan K. Puthoff writes: “The November 2007 issue of the Alternative Cosmology Group Newsletter has been posted at:

<http://www.cosmology.info/newsletter/2007.11.htm>.” Are quasar redshifts distance-related or intrinsic? M. B. Bell uses the apparent motion of the jets emitted from quasars and active galactic nuclei (the smaller version of the same objects) to argue that redshifts are intrinsic, not indicative of distance. Radio observations over periods of years have shown bright knots of plasma moving outwards from quasars along narrow jets. Bell contends that the relationship between the maximum angular velocity observed in the jets for a quasar of a given apparent magnitude is most easily explained if the sources have intrinsic redshifts. (<http://arxiv.org/abs/0711.2607v1>)

### **NGC4319 & Markarian 205: connected by a luminous bridge?**

<http://uanews.ua.edu/oct02/astro100802.htm>. Dr. Jack Sulentic, a professor of astronomy at The University of Alabama, says a release from the Hubble Heritage (an organization connected with the Space Telescope Science Institute) incorrectly reports that there is no bridge between the famous galaxy-quasar pair NGC4319-Markarian 205. In 1983, Sulentic reported that both low-redshift Galaxy NGC4319 and high-redshift quasar Markarian 205 were connected, which supported a claim presented in 1972 by astronomer H.C. Arp at the Max Planck Institut fur Astrophysik, Munich, Germany. Many astronomers argued that Arp’s data had to be either incorrect or due to something other than a physical connection, since the redshift-implied distances of both objects are significantly different. Through image enhancement and analysis, Sulentic directly confirmed Arp’s findings of a luminous connection between the two. His evidence was based on processing Arp’s Palomar and Kitt Peak telescope images.

At the time, two alternate explanations for the connection had been proposed: a foreground star or background galaxy located between galaxy NGC4319 and the Markarian 205 quasar giving the appearance of a connection; or, the fuzzy edges of the two objects overlap when viewed through the telescopes. Sulentic analyzed the light distribution in the area between the quasar and the galaxy and showed mathematically that neither theory was possible. He stands by his finding. The new news release claims that the most recent Hubble Space Telescope images of this system do not show a connection. Sulentic notes that a quick glance at the HST composite image reveals that the image of the galaxy-quasar pair is presented in a way that emphasizes the brightest parts of the galaxy and the quasar so that the impression is given that there is no light between the two objects. However, the filamentary connection is of low surface brightness, requiring contrast adjustment to see it. The human eye cannot see all the needed light levels at once without such a contrast change to “burn out” the bright parts



of the image and emphasize the fainter light levels. When that is done, the new Hubble picture actually does show the luminous connection exactly where it was seen in the earlier studies.

The right image on the cover of this Bulletin issue shows the galaxy and quasar, with a rectangular box drawn around the area where the connecting bridge should be. The box alone is then contrast-adjusted to bring up anything of low surface brightness, allowing the bridge to be seen. And the existence of this bridge means the redshift is not indicating the correct distance for at least one of these two objects.

### **Universal ‘axis of evil’ starting to look real**

<http://space.newscientist.com/article/mg19425994.000-axis-of-evil-a-cause-for-cosmic-concern.html>. Evidence is growing that the so-called "axis of evil" – a pattern apparently imprinted on the radiation left behind by the big bang – may be real, posing a threat to standard cosmology. Two scientists noticed a curious pattern in the map of the cosmic microwave background (CMB) created by NASA's WMAP satellite. It seemed to show that some hot and cold spots in the CMB are not distributed randomly, as expected, but are aligned along what has been dubbed the axis of evil.

Now, two independent studies seem to confirm that this surprising pattern really exists. Analysis of the polarization of light from 355 quasars found that as the quasars get near the axis, the polarization becomes more ordered than expected. Taken together, the polarization angles from the quasars seem to corkscrew around the axis. And another analysis of 1660 spiral galaxies from the Sloan Digital Sky Survey found that the axes of rotation of most galaxies appear to line up with the axis of evil (<http://www.arxiv.org/astro-ph/0703325>). The probability of this happening by chance is less than 0.4 per cent. [Communicated by Robert Turner.]

### **Do high-energy gamma rays travel slower than low-energy rays?**

<http://media.www.californiaaggie.com/media/storage/paper981/news/2007/10/10/ScienceTech/Space.Discovery.May.Challenge.Einsteins.Theory-3022842.shtml>; <http://www.astronomyreport.com/Research/Gamma-Ray-Delay-May-Be-Sign-of-New-Physics.asp>. In August, an international team of scientists made a discovery that could radically change our view of the universe. The team operates and analyzes results from the MAGIC (Massively Atmospheric Gamma-ray Imaging Cherenkov) telescope located in the Canary Islands. The MAGIC team discovered that high-energy photons emitted from a black hole more than 300 million years ago arrived four minutes later than the low energy photons. This discovery casts doubt on Einstein's theory of relativity, which has been the basis of modern physics for many years. The new results suggest that our old view of space is incorrect and that space behaves more like a material than an empty vacuum.

The photons started their life more than 300 million light years away in Markarian 501, a galaxy with a black hole at its center. From time to time, Markarian 501 sends out bursts of gamma rays in the direction of Earth. The scientists working with the MAGIC telescope analyzed two kinds of photons interacting with the Earth's atmosphere. Both kinds of photons were believed to have been emitted at the same time,

yet high-energy photons arrived four minutes later than low-energy photons. These observed results contradict Einstein's general theory of relativity, which claims that all photons travel at the same speed. [Communicated by David de Hilster and by Roy Keys.]

In Meta Science, the source is not a black hole but rather a supermassive star or cluster of stars. So there is no need for the high-energy photons and the low-energy photons to originate from the same layer within the star or cluster. And because such objects have extremely strong gravity, propagation delays near the source can be quite extreme. So none of this delay need have accumulated along the journey through open space to Earth.

### **NeWiki: A new science supplement to Wikipedia**

[http://www.newiki.org/main/index.php?title=Main\\_Page](http://www.newiki.org/main/index.php?title=Main_Page). “The purpose of NeWiki is to provide a place for new knowledge to be written and catalogued that is not allowed by other Wiki's who do not publish outside of the mainstream. The advance of science even today most often operates without the support or permission of the establishment and often is chastised by it. Yet it is the fringe and often unrecognized champions of human ingenuity that take the chances and propel the human race forward despite the rest of us. For the first time in history, we have the technological means to catalogue this work for the rest of the world to instantly access these new discoveries and directions in an encyclopedia. The human race since the beginning of time, has done itself a great disservice by not providing a place for the free flow of ideas that are not under the pressure of fear from going against convention. Sadly, in the beginning part of the 21st century, this has yet to change - until now. We hope this NeWiki will break this chain of intolerance. If Copernicus or Galileo were alive today, this is where you would find their work.”

###

***“Like the ski resort full of girls hunting for husbands and husbands hunting for girls, the situation is not as symmetrical as it might seem.” – Alan MacKay***

## GENERAL INFORMATION

Pertinent articles and discussion of published articles, especially those related to Meta Science, are welcome. The preferred format is Microsoft Word. Appropriateness for this Bulletin is at the discretion of the editor; but if accepted by referees, articles will be published without significant editing of content. A response by the editor or a referee may then also be published. The first author is shown any such response and offered the opportunity to adjust his contribution in the light of the response. If time permits, this process is iterated until all parties are satisfied. Until the publication deadline, authors have the option to defer publication to a later issue to complete this process.

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The name “Meta” (pronounced with a short “e”) comes from the dictionary meaning of that prefix: “later or more highly organized or specialized form of; more comprehensive; transcending; used with the name of a discipline to designate a new but related discipline designed to deal critically with the original one.”

[Meta Research] / [Eclipse Edge] E-mail: [tomvf@metaresearch.org](mailto:tomvf@metaresearch.org)  
PO Box 3604 Meta Research web site: <http://metaresearch.org>  
Sequim WA 98382-5040 Store: <http://metaresearch.org/home/store/advanced/>  
Phone: 360/504-1169 Message Board: <http://metaresearch.org/msgboard>  
Fax: 866/758-3792 Eclipse Edge web site: <http://eclipseedge.org>

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## AUTHOR INFORMATION

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