Press Release (Science)

The Pioneer Effect Discovery and the Amazing Theory that Predicted it

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Journal article announces early prediction of the Pioneer Effect
Paul A. LaViolette, "The Pioneer maser signal anomaly: Possible confirmation of spontaneous photon blueshifting." *Physics Essays* **18**(2) (2005/2007): 150-163. In print as of January 2007. Journal download: http://www.physicsessays.com

In 1978, while still a doctoral student at Portland State University in Portland, Oregon, Paul LaViolette made a prediction, which like Einstein's prediction of the bending of starlight may one day be destined to shake the world. At that time, he was developing a unified field theory called subquantum kinetics. Unlike string theory, which has never made any testable predictions, LaViolette's subquantum kinetics theory makes several, ten of which have thus far been confirmed.(1) One in particular challenges the most fundamental of physical laws, the law of energy conservation. Subquantum kinetics predicts that a photon's energy should not remain constant but rather should change with time, that photons traveling through interstellar space or trapped within stars or planets should continually increase in energy, although at a very slow rate. For example, his theory predicts that a photon traveling through our solar system should increase its energy at a rate of somewhat greater than one part in 10^{18} per second.

While this rate of energy change is far too small to measure in the laboratory, if present it would be extremely significant for astrophysics. Essentially, it would require that astrophysicists scrap all their existing theories on stellar evolution and stellar energy production. Subquantum kinetics predicts that all celestial bodies, whether they be a planet or star should produce energy in their interior. Although the energy excess produced by any given photon each second would be incredibly small, when the cumulative effect of trillions upon trillions of photons inside a planet or star are added up, the amount of energy becomes quite sizable. LaViolette coined the term "genic energy" to refer to this spontaneously created energy. More about this may be found in his book *Subquantum Kinetics* and *Genesis of the Cosmos*.(2, 3)

Although the effect would be too small to be observed in the laboratory, the energy increase accumulated as an electromagnetic wave traveled vast distances through interstellar space should be visible as a slight increase in its frequency, a photon's frequency being directly dependent on its energy. As a result, the photon should accumulate a detectable frequency blueshift.* LaViolette proposed an experiment in which a maser (microwave laser) signal would be sent out from a spacecraft located near Earth to another spacecraft located near Jupiter and then transponded back again. The entire round-trip path for the signal, which would measure about 10 astronomical units (about 1.5 billion kilometers), would be sufficient to produce a detectable blueshift. Maser signals are routinely used to communicate with spacecraft for purposes of navigation.

The Jet Propulsion Laboratory (JPL) in Pasadena, California is responsible for monitoring and navigating all of NASA's spacecraft. So in 1980 LaViolette called up a

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* Subquantum kinetics predicts a different circumstance for intergalactic space – progressive photon redshifting and energy loss, rather than photon blueshifting and energy gain. LaViolette has shown that this "tired-light effect" fits cosmological test data better than the expanding universe hypothesis. But in the immediate vicinity of galaxies and within our own solar system as well, photon blueshifting would be the rule.

scientist at JPL to inquire if they had detected any persistent blueshift in the data for maser signals that were routinely being transponded back from spacecraft. He told them the approximate amount that would be expected. The answer came back no, they had not noticed any blueshift. With further inquiry LaViolette learned that the maser signal equipment that JPL was using was stable enough to allow the expected frequency change to be detected. So he asked if the scientists there would be interested to participate in an experiment to construct a pair of spacecraft designed specifically to look for this blueshift effect. The response was that their group at JPL was mainly interested in monitoring the Doppler shift of existing signals to look for evidence of gravity waves and that presently they were concentrating their efforts entirely on getting funding for that project.

Hoping that some time in the future NASA might undertake a project to make this photon blueshift test, LaViolette wrote up a description of this interplanetary maser signal test in a paper he was writing on subquantum kinetics and which he submitted for publication that year. He included a numerical prediction which specified the magnitude of the frequency blueshift as a function of the maser signal's round-trip flight time or flight distance. The paper was finally published in 1985 as a series of three papers appearing in a special issue of the *International Journal of General Systems*.(4)

In the following years, John Anderson, who was a member of the JPL group that was interested in gravity wave detection, began to notice that a blueshifting effect might be present in the Pioneer 10 maser signal data that was routinely monitored. Finally in 1992 he decided to initiate a formal study. In 1998, eighteen years after LaViolette's phone conversation with JPL, he and his team publicly announced that they had found a persistent unexplained blueshift in the maser signal data being transponded back from the Pioneer spacecraft which at that time had journeyed well beyond the orbit of Pluto. This is exactly the effect that LaViolette had predicted and it was found almost exactly in the way that he had suggested. The only difference is that the outgoing maser signal in this case originated from a ground based radio telescope rather than from a spacecraft near the Earth. Also the remote spacecraft transponding the signal back had journeyed outward to a much greater distance, 67 astronomical units from Earth, rather than just 5 astronomical units. Consequently, there was a much greater round-trip distance over which photon blueshifting could take place, thereby allowing a much larger blueshift to accumulate and therefore be more evident.

Anderson and his team, however, chose to attribute the effect to a different cause. They may have been unaware of LaViolette's published prediction and may have forgotten about his 1980 phone call to their JPL gravity wave group. They instead decided to attribute the frequency shift anomaly to some sort of unknown force that they assumed was pushing the spacecraft toward the Sun and slowing its outward journey as it left the solar system. They estimated this inward acceleration to be $8.7 \pm 1.3 \times 10^{-8}$ cm/s^2, about one ten billionth of the Earth's gravitational acceleration (10^{-10} g's). This would have Doppler blueshifted the spacecraft's return maser signal causing it to be less redshifted than expected, thereby creating an anomalous maser frequency increase of $2.9 \pm 0.4 \times 10^{-18}$ per second. This "unexplained" phenomenon came to be known variously as the "Pioneer effect" or as the "Pioneer anomaly."

Initially, LaViolette had little information about the discovery. What little he knew came from reading a vague story about it in the *New York Times*. Suspecting that the JPL group may have detected his predicted blueshifting phenomenon, Dr. LaViolette immediately contacted Anderson. He told him about his theory's prediction and the discussion he had with one of Anderson's JPL colleagues back in 1980. Anderson sounded interested in LaViolette's blueshifting prediction and planned to work out whether the predicted amount could account for the anomaly that his team had observed in the data. He asked Anderson for a preprint copy of his paper, but weeks went by and none arrived. He also had mailed Anderson a copy of his book, *Subquantum Kinetics*, marking the page where it described the spacecraft maser signal experiment that he had proposed back in 1980. The page also specified the approximate photon blueshifting rate that the theory predicted should be

observed. But he received no reply back from Anderson.

Anderson's paper was published a week later in the journal *Physical Review Letters*.[5] Their data indicated the presence of a frequency blueshift that was about twice as large as LaViolette had predicted 18 years earlier, but that lay within two standard deviations of the error limits of that prediction. Hence within the limits of error their findings were a direct confirmation of the effect that LaViolette had sought. Since the JPL team reports that they first became aware of an anomalous frequency shift accumulating in the data beginning in the early 1990's, their discovery of the effect decidedly post dates the publication of LaViolette's prediction as well as his discussion with the JPL scientist over a decade earlier. But nowhere did their paper mention LaViolette's prediction.

The JPL announcement triggered a flurry of interest from the physics community and received extensive media coverage. As each year passed the number of papers published on this phenomenon sky rocketed, so much so that many journals became flooded with papers proposing all kinds of unusual theories to account for the effect. The inundation was so great that some journals even had to initiate a policy not to consider any papers written on the subject. Apparently lost in this hubbub was the fact that the existence of this maser signal blueshifting effect had already been predicted many years earlier. In 2002 Anderson's group published a second paper on the Pioneer Effect,[6] but again they made no mention of LaViolette or the subquantum kinetics prediction even though LaViolette had earlier made Anderson aware of it.

LaViolette had lost precious time to bring wider attention to his prediction. The vague newspaper article he had read in 1998 gave no details about the magnitude of the frequency shift effect. Not receiving any response back from the letter and book he had sent to Anderson and not receiving the requested journal paper preprint or reprint, LaViolette soon forgot the matter, being at the time entirely engrossed in his new job as a U.S. patent examiner. It was not until news media press releases were again circulating in 2002 about the findings of Anderson's group and the imminent publication of an updated paper about the effect that LaViolette's interest was again awakened. At the library he looked up the team's 1998 publication, and after making a few simple calculations he realized that the Pioneer results they were reporting confirmed his prediction. He attempted again to contact Anderson to alert him to his theory's prediction. But Anderson would not return any of his emails or phone calls. He managed to alert some of Anderson's group members to his prediction, but was met with what might be interpreted as a general lack of interest.

In an effort to make the physics community aware about his theory's prediction, LaViolette wrote up a paper about it and its confirmation by the Pioneer effect results. Between April 2002 and December 2004 he submitted it to eight journals, but none would publish it. In March of 2003, he had sent the paper to Professor Jean-Pierre Vigier, one of the editors of *Physics Letters A*. Vigier expressed great interest in the paper and said he was willing to pass it on to the editorial board for consideration. But before he was able to forward it, he met with an untimely accident, having fallen down the stairs of his home and thereafter lapsed into a coma. LaViolette was asked to resend his paper to one of the other editors who had taken over Vigier's journal review work. But this other editor took no special interest in his blueshifting prediction, and not surprisingly, LaViolette's paper was summarily rejected. Finally, at the end of 2003 he submitted his paper to the journal *Physics Essays*, and after going through a long an arduous review it was accepted, appearing in print in January 2007 after a one and a half year delay due to a backlog in the journal's publication schedule.[7]

LaViolette points out that the anomalous force interpretation advanced by the JPL group is problematic since, if a mysterious force of this magnitude were present, it would also necessarily be pushing the planets towards the Sun and cause their orbital periods to accelerate. But, the planetary orbital periods are known to very high precision, and astronomical data shows that no such orbital acceleration effect is present, a point also acknowledged in Anderson's paper. So on the one hand, we have the JPL scientists advancing their anomalous force theory in a somewhat tentative manner, acknowledging that it may be problematic

and reasoning after the fact on the basis of results that emerged from careful analysis of the maser data. On the other hand, we have Dr. LaViolette who made his prediction over a decade prior to the effect first becoming noticeable to the JPL group and 18 years prior to the publication of the JPL findings, but receiving no mention in their paper.

Most would agree that if a theory makes a prediction and that prediction is later verified, then there is good reason to consider that the theory may be correct and that it should be given serious consideration. Take for example Einstein's general theory of relativity and his 1917 prediction that gravity should bend starlight. Five years later Sir Arthur Edington and his collaborators carried out an experiment to test Einstein's theory. During a solar eclipse, they observed the Sun as it passed in front of a background star. As the star approached the Sun's limb, its light trajectory was bent inward toward the Sun, just as Einstein predicted. Einstein instantly became a celebrity and his special and general theories of relativity thereafter became adopted by physicists all over the world.

For some reason the scientific system, that has worked in the past, failed miserably in the case of LaViolette's blueshifting prediction. As to why the discoverers of the effect showed no interest in citing the prediction is puzzling. Was it their reluctance to part with one of the most sacrosanct laws of physics? Indeed if the subquantum kinetics genic energy blueshifting effect is acknowledged, this would undermine one of the most important principles of physics, the First Law of Thermodynamics. If LaViolette's prediction were true, it would suggest that this law is routinely violated in nature, although by an extremely small amount. The implications of this would be more far reaching than the early discovery that celestial bodies are capable of bending starlight trajectories. But for some reason, the discoverers of the Pioneer effect were turning their heads the other way.

Although LaViolette's prediction came out of a theory that was quite different from standard field theories, subquantum kinetics nonetheless has demonstrated a very good track record, having had 10 apriori predictions subsequently verified. Furthermore prior to the formulation of the maser signal experiment prediction, the genic energy prediction had already achieved success in accounting for planetary and stellar mass-luminosity data. An early test of the prediction was to determine whether planets such as Jupiter, Saturn, Uranus, and Neptune might be producing energy in their interiors. The answer was affirmative. Infrared telescope measurements made by various spacecraft showed that indeed they radiated substantial amounts of heat from their interiors. As a further test, LaViolette plotted the mass-luminosity coordinates for each of these planets along the mass-luminosity trend line for red dwarf stars. This relation, first discovered by Sir Arthur Eddington shows that red dwarf stars follow a logarithmic trend on a graph that plots a star's luminosity against its mass, a stellar luminosity increasing approximately as the 2.75 power of stellar mass. No one had done this before perhaps because planets were assumed to be energetically dead masses in the process of cooling off and hence should not follow the trend line of active stellar bodies. To his surprise the mass-luminosity coordinates for the jovian planets lay along the lower main-sequence stellar mass-luminosity relation indicating that both planets and red dwarf stars were being powered by the same energy generation mechanism. This commonly shared energy source could not be fusion because the temperature and density in the interior of a planet is far too small to support thermonuclear fusion. Also the presumption that the body is cooling and releasing heat from an internal heat reservoir also fails because this energy source is insufficient to sustain the prodigious energy efflux emitted by red dwarf stars. Consequently, the conformance of the planets to the stellar M-L relation is unexplained by standard theories, leaving the genic energy concept to be the only viable explanation. In fact, the subquantum kinetics genic energy relation predicts the proper exponential rise of luminosity with mass. It was precisely by performing a model fit to this planetary-stellar M-L data that LaViolette was able to produce a numerical value for the rate of photon blueshifting in interplanetary space, a testable prediction, and thereby propose his spacecraft maser signal experiment.

Higher mass stars, those lying along the upper stellar main sequence, would be powered primarily by nuclear fusion. The existence of two mass-luminosity trend lines, and upper

and lower branch, then becomes understandable. Stars belonging to the upper branch would be those in which nuclear fusion was adding its contribution. This genic energy M-L prediction achieved an added success after confirmation of its prediction that brown dwarfs would also conform to the same lower mass-luminosity relation as a low mass extension of the red dwarf trend line. Professor Panagiotis Pappas a physicist at the Technical Education Institute in Piraeus, Greece has publicly stated that "LaViolette deserves two Nobel prizes for his M-L relation finding alone."

It was not only journals that resisted publications of LaViolette's prediction. The physics internet archive *arxiv.org* also blocked him from posting a preprint of his paper. Formerly administered by Los Alamos Laboratories, and presently under the oversight of Cornell University, it has now grown to be the central electronic preprint repository for the physics community. This has the advantage of speeding up the communication and exchange of ideas since the journal peer review process can take many months or sometimes years. In fact, numerous papers discussing the Pioneer effect were being posted to the archive's general relativity/quantum cosmology section. Hoping to make an early announcement of his theory to his physics colleagues, LaViolette attempted to post his paper to the archive, but was repeatedly met with road blocks. Even though he had followed the archive's posted instructions and obtained a sponsor for his paper, the archive administrators repeatedly withheld their approval. Although one sponsor is normally required, LaViolette had come up with several sponsors all willing to support the papers' uploading to the archive.

One of these sponsors was Nobel Laureate Hans Bethe. Bethe had received the Nobel for his theory that stars are powered by nuclear fusion. LaViolette's genic energy prediction, though, challenged that notion, suggesting that red dwarfs are instead powered by energy arising from photon blueshifting and that genic energy even makes a substantial 10 to 15 percent contribution to the Sun's total energy output. Even though he had the most to lose to support the posting of LaViolette's paper, he was nevertheless willing to back it. Referring to the blueshifting prediction, he said the he felt that LaViolette "may have something there" and that he "didn't know of anyone else who had proposed something similar." Bethe made several telephone calls to Dr. Ginsparg, the archive's director to communicate his support of LaViolette's admission to the archive, but Ginsparg refused to return his calls. LaViolette them presented them with a third sponsor who had posted papers to the archive on the Pioneer Effect. No response came back. After making repeated requests to allow his paper to be posted, the archive's administrator finally stated that they wished no further communication with him and suggested instead that he seek publication in a refereed journal. Other physicists who proposed relatively speculative theories to account for the Pioneer Effect were able to post papers to the archive, but did not receive similar treatment.

In 2004 LaViolette filed a complaint with the National Science Foundation complaining about the archive's discriminative practices. Several other dissident physicists who like LaViolette had been blocked from posting their work to the archive subsequently filed lawsuits against both Cornell University and NSF. In an effort to avoid sticky legal proceedings, NSF cut off funding to the arxiv.org program although it is rumored that NSF funds still flow to the program being laundered from other Cornell University research budgets.

Learning that others had suffered similar fate and obtaining some of their names, he contacted these physicists and together the group organized themselves into a resistance movement. They eventually launched a website *www.archivefreedom.org* which criticizes the repressive policies of the Cornell preprint archive and where victims can post stories of what they have gone through. Confronted with this pressure, and reprimanded by National Science Foundation officials, the archive administrators relented and finally allowed LaViolette's paper to be posted. Although they corralled it into a separate physics category, segregating it from the section forum where papers discussing the Pioneer effect were usually posted.

The implications of LaViolette's genic energy prediction may extend far outside the battle with the white tower physics establishment to embrace society as a whole. Routinely the U.S. Patent Office rejects patents on so called free-energy devices that claim to generate energy without burning any kind of fuel. To do this they cite violation of the First Law of Thermodynamics. Even though the inventor in many cases provides signed affidavits of witnesses claiming to have tested the device and affirming that it works just as claimed, usually the patent is rejected in deference to the sacred law of energy conservation. As a result, many inventions that attempt to provide us with an alternative to burning fossil fuels end up in society's trash bin. By casting doubt on the absolute validity of this law, the genic energy prediction could help to thaw patent examiners' prejudiced stance on these technologies. With global warming well upon us, it is time the physics community takes a fresh look at LaViolette's prediction and does some deep soul searching. If physicists choose to continue to defend their First Law, perhaps we had better start building boats.

1) See list at: http://home.earthlink.net/~gravitics/LaViolette/Predict2.html.

2) Paul A. LaViolette, *Subquantum Kinetics: A Systems Approach to Physics and Cosmology* (Niskayuna, NY: Starlane Publications, 1994, 2003); http://home.earthlink.net/~gravitics/LaVioletteBooks/Book-SQK.html.

3) Paul A. LaViolette, *Genesis of the Cosmos: The Ancient Science of Continuous Creation* (Rochester, VT: Bear & Co., 1995, 2003); http://www.curledup.com/gencosmo.htm.

4) Paul A. LaViolette, "An introduction to subquantum kinetics." Parts I, II, and III. *International Journal of General Systems* **11** (1985):281-345.

5) John D. Anderson, et al., *Physical Review Letters* **81** (1998): 2858-2863; Eprint http://arXiv.org/abs/gr-qc/9808081.

6) John D. Anderson, et al., *Physical Review D* **65** (2002): No. 082004; Eprint: http://arXiv.org/abs/gr-qc/0104064.

7) Paul A. LaViolette, "The Pioneer maser signal anomaly: Possible confirmation of spontaneous photon blueshifting." *Physics Essays* **18**(2) (2005): 150-163. Eprint available at: http://arxiv.org/abs/physics/0603191.html. Journal download available at: http://www.physicsessays.com.

(Note: although this paper has a 2005 date, due to a backlog in the journal's publication schedule, it did not appear in print until January 2007.)