observed effect), but this is over a million times smaller than the mass of the electron, which itself is by far the smallest mass appearing in the Standard Model!

Most theoretical physicists would welcome such tiny, non-zero, neutrino masses as an encouraging sign that their ambitious ideas may be on the right track, so they are anxiously awaiting additional observations by the SuperKamiokande team in the coming months. These will either sharpen or compromise the now recognised anomaly in cosmic-ray neutrinos. They are hoping for decisive observations that the 'lost' muon neutrinos still exist in another form. But that would probably be the downfall of the separate laws of lepton-number conservation.

Once again, it seems that the more we learn, the more questions there are that remain unanswered. Man's quest to describe and explain what matter consists of, and what holds it together, only in terms of what can be seen in 'Nature', will always be unending because of rebellion against our Creator and refusal to recognise and submit to His pre-eminence, authority and power.

'For by him were all things created ... all things were created by him, and for him:

And he is before all things, and by him all things consist [hold together].' (Colossians 1:16,17)

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A. A. Snelling

The Planet That May Be There, After All!

Planet hunters are breathing a sigh of relief— it is again possible that there might be a planet orbiting the star 51 Pegasi. In the last three years there have been claims of up to eight planets having been discovered orbiting around distant stars, and the one associated with 51 Pegasi was the first and leading candidate (see Figure l).[1,2] There had been much speculation that just as our star, the Sun, has planets orbiting it, then other stars should also have associated planetary systems. So recent 'discoveries' were not unexpected.

It was in 1995 that Mayor and Queloz of the Geneva Observatory reported that 51 Pegasi is wobbling from the gravitational pull of an orbiting planet.[34] The announcement caught the scientific world off guard, not only because it was the first planet found around a Sun-like star, but because the orbital period of 4.2 days implied that it is 20 times closer to its star than the Earth is to the Sun (see Figure 1). Such extreme proximity for a Jupiter-mass planet (or any planet) was unanticipated by conventional (evolutionary) theories of planet formation.

However, early last year at the University of Western Ontario, Gray issued a serious challenge, asserting that his evidence showed that the slow 'jitters' (periodic changes) in the star's spectrum which had been thought to result from a planet's periodic tug were actually due to the pulsation of the star's gases.[4-6]

Since then other astronomers have searched for the alleged pulsation, but failed to find it. One team, led by Brown of the High Altitude Observatory in Boulder, Colorado, used a telescope on Mount Hopkins in Arizona to obtain high quality spectra of 51 Pegasi. If the star were pulsating, the shapes of its spectral lines should vary. But they remained constant. Now Gray has retracted his challenge, reporting the absence of pulsations in the star's spectra based on further observations he has made with his original apparatus.[7] And concurrently, Hatzes and co-workers made about 120 measurements of several of 51 Pegasi's absorption lines at more than twice Gray's spectral resolution and have reported seeing no changes in the line shapes (see Figure **2).**[8]

Because his original 39 noisy data points were scattered over seven years, Gray (and others) now emphasise that there was roughly a one-in-300 chance that a spurious 4.23-day signal might show up by chance.[57] And that appears to be what happened. 7 *have to conclude that nature played a dirty trick on him* [Gray]', said Brown.

The heat has now come out of the debate over the 51 Pegasi planet as this technical disagreement has faded. But some of the protagonists have expressed dissatisfaction that Gray's original paper was not thorough enough in its statistical treatment and used less than equivocal language about the spectral-line variations.

'But those critics', says Marcy, as astronomer at both the University of California at Berkeley and San Francisco State University, *'may occasionally forget that competition and human emotion have always provided fuel for the*

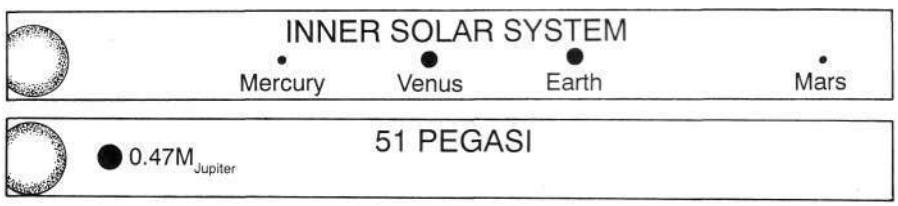

Figure 1. *The star-hugging planet, of almost half Jupiter's mass, inferred from a wobble in the spectrum of star 51 Pegasi, compared with the planets of the inner Solar System.*

vigorous pursuit of alternative theories. It was right that the planet interpretation should not go unchallenged. . . . In the end we should be impressed by the exquisite care with which Mayor and Queloz examined every alternative interpretation right from the start — the absurd hypothesis of a Jupiter-mass companion in a 4.2-day orbit faced its most severe inquisition from the discoverers themselves'.[1]

Thus there may be a planet orbiting around the star 51 Pegasi after all. To creationists this should neither surprise us nor cause us dismay. The Creator Who made the Solar System is fully capable of having created other planets orbiting other Sun-like stars if He so chose (to manifest his manifold power). However, this would not automatically mean the likelihood of other intelligent life, or even people, on such planets. First, God has not told us of such in His Word. On the contrary, all His creative activity was centred with respect to our Earth as our home, with man made last and alone in His image. Second, the whole creation (cosmos) is groaning and in travail because of man's Fall into sin on this Earth (Romans 8:19-22), and it was to this Earth the Creator, Jesus Christ, came to die to redeem man, so that He can eventually restore the whole creation (cosmos).

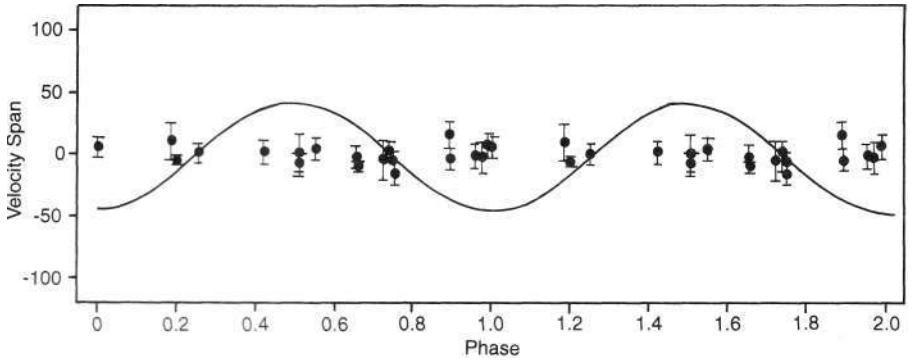

Figure 2. A measure of the shape of the spectral lines from star 51 Pegasi, expected to show regular variations (curve) if the star is pulsating, reveals no changes (after Hatzes et al.[8]).

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A. A. Snelling

Cosmic Snowballs Questioned

The idea that house-sized comets are continuously pelting the Earth '25,000-30,000 times a day, as previously reported (see Figure l),[1] has recently been disputed, in front of more than 7,000 geophysicists who gathered in San Francisco December 8-12, 1997 for the annual fall meeting of the American Geophysical Union,[2] and in a paper published in the December 15, 1997 issue of **Geophysical Research Letters** (GRL).[3,4]

It was space physicist Louis Frank of the University of Iowa who first proposed these cosmic snowballs back in 1986 to explain dark spots seen in satellite images of the upper atmosphere — like atmospheric 'holes'. Dismissed as instrument noise 11 years ago by other investigators, early last year Frank triumphantly announced he had found identical spots in images from a new satellite, Polar, which persuaded a few researchers that perhaps something peculiar was going on in the upper atmosphere.[1,3] Frank's claim also appeared to be supported by the appearance of the same spots not only in his own camera aboard Polar, but also in the Ultra-Violet Imager (UVI) of one of his colleagues on the Polar team, George Parks of the University of Washington, Seattle.

Now the tables seem to have turned, yet again. Parks withdrew his name from the paper, co-authored with Frank, which claimed this two-camera detection, and also made public his own analysis of the spots in his UVI images, suggesting that the spots behave just like artifacts somehow produced inside the camera. The results were published in his GRL paper.[2] He found, for example, that the number of spots of a given size decreased steadily from the smallest to the largest, just like the noise in lab

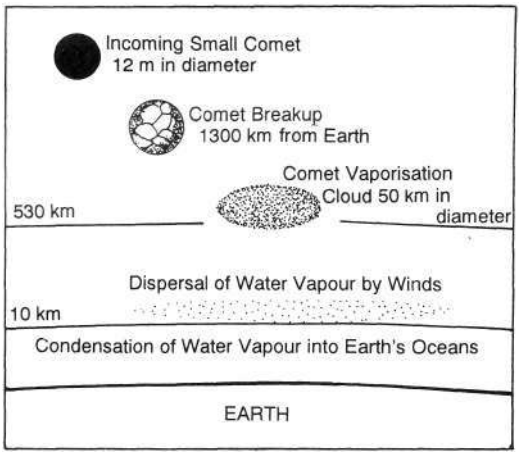

Figure 1. *The fate of hypothesised small comets entering the Earth's atmosphere.*