relative to the Earth. The proposed positional dependency of the rest mass of the photon . . . is consistent with a cosmological anisotropy of light; one that can be linked . . . to an invariant rest mass of the graviton . . . through the latter's *indirect* decay into photons when mediated by . . . the strong nucleonic charge and that of the electron . . . via their local decay into photons. . . .

When the rotational anisotropic angle . . . is set equal to the 2 of the spin one photon . . . a magnitude precisely equal to the . . . mass scale estimate of the Nodland-Ralston's cosmological light anisotropy model [is required]. (See "Cosmologists Attack LaRouche" article in this issue for a description of the Nodland-Ralston work.)

Gravitational anisotropy of light, when applied to the *interior* of the Earth, accounts for the key spectral factor (1.00078) required by Lanzerotti et al. to quantitatively establish a p and g wave helioseismological link between the Earth and Sun; one involving the coherence of the near vacuum of the solar wind.

A general non-locality between the Sun acting as an inertial center of mass and the orbiting Earth acting as a local gravitational center of mass, one consistent with Bell, is found to be an experimental prerequisite of non-equivalence. . . .

Soldano goes on to show that a unification of quantum physics, quantum electrodynamics, the nuclear strong force and the weak force were already implicit in Ampère's law:

> The significance of these analogues lies in the observation that extensions of Ampère's law, particularly those of Gauss and Weber, have reaffirmed the existence of a highly controversial longitudinal force [of Ampère]. . . . The latter suggests that Ampère's law possesses implications beyond the usual space-time considerations. . . . [This represents] the consequence of a "local" charge non-conservation; the latter ultimately attributable to mass non-equivalence. Not only does [this] . . . involve both the strong and electromagnetic coupling constants, but it characterizes the local photon rest mass as well. These quantities define the nature of the longitudinal force.

As the late Dr. Robert Moon, chief scientist of the Fusion Energy Foundation, so often emphasized, scientific research must be a moral discipline; the search for truth must be primary. By ignoring the physics of Ampère, Gauss, Weber, and Riemann, 20th-century science has unnecessarily buried itself in spurious parodox and obfuscation. Hopefully, we can now begin to change that.

Cosmologist attacks LaRouche on 'cosmological birefringence'

by Charles B. Stevens

Last spring, Dr. Borge Nodland, from the University of Rochester, and Dr. John P. Ralston, from the University of Kansas, published in *Physical Review Letters,* the stunning discovery that observations on the degree of polarization of radio waves from distant galaxies indicate that the speed of light varies, and that there exists a preferred axis for light travel through the universe, along which the speed of light is greatest, and this physical geometry is handed, or chiral, acting like a giant corkscrew. (In other words, the vacuum of universal space-time is organized like a crystal, and exhibits a "cosmological birefringence" for the propagation of electromagnetic waves.)

This finding has come under strong attack from the physics establishment, but Nodland and Ralston have refused to recant. The largest website on the Internet devoted to attacks on Nodland and Ralston, is the home page of Dr. Sean M. Carroll of the Institute for Theoretical Physics of the University of California, Santa Barbara, under the title: "Is there evidence for cosmic anisotropy in the polarization of distant radio sources?"

Among the material contained there, is an attack on Lyndon LaRouche. After discussing the technical papers on the Nodland-Ralston effect, Dr. Carroll reports: "Diffusion into the culture continues apace. The preferred direction has made the funny pages, courtesy of Hilary Price's *Rhymes With Orange*. Equally amusingly, it turns out that *Lyndon LaRouche* knew it all along. . . ." Carroll then quotes from an "EIR Talks" radio interview with LaRouche on May 7, 1997.

LaRouche was asked: "Let me ask you a question from physics and astronomy. Various scientists who have worked

with you, are excited about a report in *Physical Review Letters* April 21, by physicists Nodland and Ralston, who have data which they say indicate that the speed of light, through the universe, through essentially the vacuum of the universe, is not constant, as it's supposed to be, but in fact, the speed of light varies, systematically, according to the direction of travel of light, through the universe. We're talking on a scale much, much bigger than galaxies. Many think that, in fact, this vindicates physical views of yours, against others."

LaRouche replied: "Well, it does in a sense, but it's not just my views. It's been known for a long time. My work has become associated with the work I've done on Riemann, and in some respects, in some aspects, I'm an authority on this work of Riemann's—the field of physical economy is my specialty.

"Now, the problem here is, that as long as people try to explain certain things from the standpoint of incompetent physics, they're going to find that there are a lot of problems that keep arising; their physics doesn't work. So, we have to distinguish in these kinds of cases, where you get this big alarm about this question of the speed of light; part of the problem is that people have been using the wrong physics. And now what they try to do, when this comes along, they try to explain the phenomenon, which is perfectly consistent with what we knew about the universe before this—there was nothing new about this. This was already discussed in the 19th century. . . ."

Contrary to what Carroll indicates, LaRouche does not claim to have already known what Nodland and Ralston discovered, only that this type of effect is to be expected from the 19th-century work of Ampère, Gauss, Weber, and Riemann. In fact, a collaborator of Lyndon LaRouche, Prof. Benedetto Soldano, has just published a book, *Non-Equivalence, a Key to Unity,* which elaborates on these questions in great detail. Soldano reviews the entire array of 20th-century fundamental physical experiments, including the most recent results on the W intermediate vector boson anomalous decay, and shows that they can only be understood from the standpoint of Ampère, Gauss, and Weber's electrodynamics. The book begins by noting that the Nodland-Ralston effect is completely coherent with this broader range of experiments and independently substantiated by them. (For a more detailed discussion of Soldano's work and its broader implications, see "New Findings Show Magnetic Organization of the Sun," in this issue.)

The Nodland-Ralston effect

Almost all astrophysical thinking today is dominated by the assumption that all large volumes of space are the same (that is, that the universe is homogeneous), and that the universe looks the same in all directions (that it is isotropic). It is conceived as having little more order than is allowed for in gas theory, where the particles (galaxies in this case) obey statistical laws of randomness, instead of being thought of as *hylozoic*. This is completely contrary to the method of approach of Carl Gauss and Bernhard Riemann, 19th-century scientists who walked in the footsteps of Plato and Leibniz. Indeed, why *should* the universe—in which life and human conscience and thought are nurtured—be homogeneous and isotropic?

The Nodland-Ralston effect directly challenges that assumption of isotropy. It indicates that the speed of light through the near-vacuum of space may not be a constant, but may vary, depending on the direction in which it travels. If they are right, then light travels slightly faster in a direction defined by an axis running through Earth and the constellation Sextans. It travels increasingly slowly at increasing angles with this direction, and most slowly at about 90° from it.

Their discovery was made by examining the behavior of plane-polarized light (including polarized radiowaves; radiowaves are just another wavelength of light), rather than the speed of light as such, the latter being a derived phenomenon. They found that the plane of polarization rotates slowly as the light travels, even in the absence of magnetic fields, and that the rate of rotation depends on the direction in which the light travels.

The Faraday plots

The starting point of their inquiry was something that radio astronomers have considered a mystery. It concerns the plane-polarized radiowaves from galaxies. In an interview, Nodland explained: "It is known that the plane of polarization of such radiowaves rotates because of the Faraday effect," which is the influence on the radiowaves of charged particles, ions, and magnetic fields between galaxies.

"Astronomers find that the Faraday rotation is proportional to the square of the wavelength of the radiowaves. If, for a certain galaxy, you plot the amount of rotation along the y-axis, and have the squares of the observed wavelengths along the x-axis, you get points that show that the amount of rotation is linearly proportional to wavelength squared; you can make a straight line through those points. If you then extrapolate this line back to wavelength = 0, you get an intercept value on the y-axis" typically not equal to zero. This is what the authors mean by "removing" the Faraday rotation and finding a mysterious "residual rotation." These plots have been published by radio astronomers since the 1960s. The "residual rotation" was thought to result from some difference in the emitting galaxies themselves, but no such difference has been found so far.

What Nodland and Ralston have done, is to suppose that the putative residual rotation is an intrinsic property of the travel of light through space. They reduced the rotations to *rates of rotation* by considering the galaxies' distances. Then they asked if the differences in the rates depended on the direction in which the radiowaves travel to reach us. With a few trials, they found that the Earth-Sextans orientation best ordered their sample of 160 galaxies. They used statistical methods to show how well it is ordered.