low density lipoprotein (LDL) receptor in its translational control. We wonder if this control is of major importance.

Sequence homology between human and bovine LDL-receptor mRNAs is substantial; however, unlike the human mRNA[3], the bovine mRNA does not contain *Alu* repeats[4]. Indeed, Hobbs *et al.*[4] reported that the genetic events that gave rise to the *Alu* cluster occurred within the past 33 million years, before the development of the Hominidae. Animal species which diverged earlier from human ancestors (for example, cow, rabbit or baboon) lack *Alu* sequences in their LDL mRNA. Despite this, there is no evidence that regulation of the LDL receptor in these species differs substantially from that in the human[5-8]. Accordingly, it becomes unlikely that *Alu* sequences play a major regulatory role in the translational control of the LDL receptor. Definite proof of a regulatory role of the *Alu* sequences in LDL mRNA awaits studies comparing the regulation of the LDL receptor produced in the presence or the absence of *Alu* sequences in the 3′ untranslated region of LDL mRNA.

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# How to test special relativity

SIR—Psimopoulos and Theocharis[1] suggest that the Michelson-Morley experiment should be repeated in space to ensure that the light reference frame is not, in fact, locally determined by electromagnetic or gravitational field effects attributable to the physical size of the Earth. Relativity recognizes only the role of the observer as the determining factor for the applicable frame of reference.

There is certainly merit in this proposal, especially as rotation can be detected by Michelson interferometer techniques (the ring laser gyro) and such rotation sensors will undoubtedly find practical application in space vehicles. It is logical to verify whether the Michelson interferometer can sense translational motion of a space vehicle, once it has moved outside the Earth's influence.

However, the underlying hypothesis of Psimopoulos and Theocharis leaves one wondering how small the ambient field effects have to be in order not to control the electromagnetic reference frame. In this regard it should be remembered that the Michelson–Morley experiment of 1887 antedates Wiener's 1890 discovery of the existence of stationary light waves when a ray of light is reflected back upon itself by a mirror. This means that in the Michelson experiments the incident ray is passing through the field of the reflected ray. We assume that this field does not affect the speed of the incident ray. If this assumption is wrong and field energy can present, in effect, a refractive index modifying the speed of light, then without appealing to the ambient effects of an Earth field we can even consider that the optimization of the energy in the standing wave system will determine the local frame of reference for light speed. Indeed, unless the action is to cause the incident light speed relative to the mirror to be identical to that of the reflected light speed, there will be an amplitude modulation of the standing wave pattern and the energy will be deployed unevenly along the ray path. It seems possible that the standing wave energy would adopt the motion of the system and assure uniformity, thus making the light-speed isotropy a forced condition of the apparatus.

Thus while Psimopoulos and Theocharis may well be correct in regarding the strong influence of the Earth as the dominating consideration, there is a possibility that a weak ambient field is sufficient. In this case the Michelson–Morley experiment cannot give any valid indication concerning motion through Maxwell's ether and this will hold also for free flight in space. Note also that a wave is not reflected back on itself in the ring laser gyro. Here, any standing waves are set up in a non-rotating frame and are not locked into the rotary motion. Clearly, therefore, the objectives of the Michelson experiments have not been met for translational motion until one devises an optical configuration that works without having light rays reflected back along the same path. Such experiments have not yet been performed in the laboratory, but are, in principle, feasible[2].

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PSIMOPOULOS AND THEOCHARIS REPLY — Aspden gives a valid theoretical objection to our proposal that the Michelson interferometer might detect its translational movement through the assumed electromagnetic ether. This seems to be a sound, though not conclusive, criticism. It is true that, unlike in the Michelson interferometer, in the ring laser gyro a ray is not reflected back on itself by a single mirror. Nevertheless, a ray is indeed reflected back on itself by a combination of optical devices. Thus everywhere in the ring laser gyro, just like in the Michelson interferometer, every ray is passing through the field of a ray propagated in the opposite direction. Therefore standing waves are set up in the ring laser gyro too (in the non-rotating frame), but they have not been observed to be locked into the rotary motion (except perhaps for very slow rotations). Likewise, standing waves are indeed set up in the Michelson interferometer (in the non-moving frame), and we would expect that they will not be locked into the translational motion. Of course the ultimate judge is the experimental test, which however has never been performed.

The practical application of optical *rotation* sensors having been mentioned, we note that such a sensor is in an advanced stage of development: Standard Telecommunication Laboratories have recently announced (*Electronics Power* **32**, 111; 1986) that they expect to have a marketable fibre-optic gyro available within two years. The practical issue which we would like to raise is: Why is there no laboratory in the world working on the development of optical *translation* sensors? The answer is the almost universal acceptance of the special relativistic postulates, and the consequent lack of interest in directly testing them experimentally. It is quite possible that this lack of interest might be preventing not only theoretical advancements, but also, as presently indicated, important technological applications. This is the chief reason why we insist that the fundamental assumptions themselves, rather than their mere inferences, should be directly and constantly tested.

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## Scientific Correspondence

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