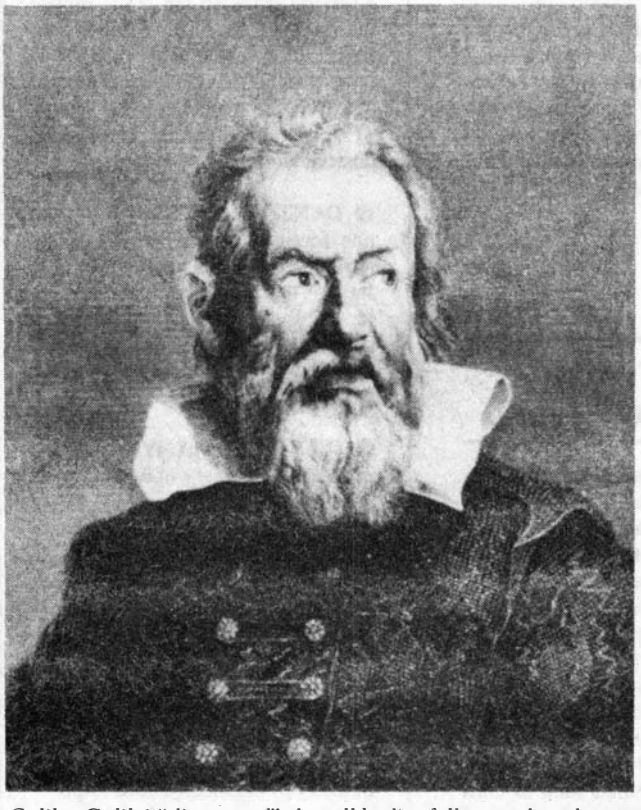
Galileo proven wrong!

Dr. Robert Moon and Carol White evaluate the discovery of a "fifth force" in theoretical physics. It's revolutionary —but is it true?

A group of physicists led by Ephraim Fischbach, of the Department of Physics of the University of Washington, has made public a claim that challenges the foundations of accepted doctrine in physics. If they are right, Galileo's "discovery" that all bodies fall to earth at the same time, regardless of their mass, will have been proven false. Fischbach published this revolutionary assertion in the Jan. 6, issue of *Physical Review Letters*.



Galileo Galilei "discovered" that all bodies fall to earth at the same time, regardless of their mass.

Of course, the amount of the discrepancy which is involved, is orders of magnitude below what might have been observed by Galileo (supposing he actually conducted an experiment—and there is a convincing body of thought which indicates that he did not). Fischbach's group posits the existence of a new, repulsive, "fifth force" in the universe, which is correlated to the distance between masses and varies according to the composition of the mass. According to the theory now dominant within the physics community, there are four forces: the electromagnetic force, related to the charge of objects; the gravitation force, which depends upon the distance between objects and their mass; the strong force within the nucleus, which is presumed to account for the fact that the nucleus is held together despite the repulsive electromagnetic force; and the weak force, which is the discrepancy which occurs in the formation and dissolution of electron-positron combinations from gamma rays, correlated to the supposed existence of the heretofore undetectable neutrino.

While we think that Fischbach's findings are extremely interesting, empirically, it is our view that his approach is wrong theoretically. Force theory as such, is incorrect. Even the traditional classical physicist must admit to being in a quandary when he tries to express exactly the forces operating among three bodies simultaneously. We have argued, in the pages of the *International Journal of Fusion Energy* and *Fusion* magazine, that the correct approach to physics must look upon the universe as a self-developing whole. Forces are typically described as primary relationships between objects. We argue, that they should instead be looked at as symptoms of a disturbance within the physical geometry of the universe—with the appearance of a force indicating work done against the universe. Thus, we agree with Kepler when

he asserted that the orbits came first, and the planets were created within them, according to laws of physical-geometry.

The ratio between the gravitational force and electromagnetic force is 40 orders of magnitude (one 10 thousand trillion trillion trillionth.) The strong force of the nucleus is, of course, orders of magnitude greater than the electromagnetic force, as is evidenced by the power of a nuclear explosion. The "fifth force," according to Fischbach, would have an order of magnitude 12 times less than the gravitational force, which itself is of an order of magnitude 40 times smaller than the electromagnetic force.

Fischbach asserts that not only do we have four forces operating, but that there is in addition a fifth. This force acts as a repulsion between objects and is at its maximum at a distance of 200 meters. This is a surprising distance, since it is neither an astronomical distance nor an atomic distance.

The results which Fischbach obtained do not depend upon independent experimental work, but rather represent a relooking at the work of Roland von Eötvös, a Hungarian scientist who made a number of precise measurements of the acceleration of different bodies under gravitational acceleration. For more than a decade, he compared substances such as cooper-platinum alloy, a silver-iron sulphate mixture, a copper asbestos mixture, a combination of water and copper, and one of tallow and copper, and concluded that, within what was then assumed to be an acceptable level of error, these bodies were accelerated at the same rate.

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Fischbach has reviewed this data from the point of view of modern physics, and discounted the effects of the strong and weak force (unknown to Eötvös). He then subjected the remaining error to statistical analysis, and determined that, according to the standards of high-energy physics, there is a significant error, and that it is incorrect to state that the acceleration of these bodies was equal.

The formula which Fischbach uses to describe his fifth force, has actually been in circulation several years. It was

NSIPS/Stuart Lewis

Dr. Robert Moon, physicist and editor-in-chief of the International Journal of Fusion Energy.

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EIR's Science & Technology Editor Carol White gives a geometry class.

empirically derived by D.R. Long, who published it in the magazine *Nuovo Cimento* in 1980. It has also been referred to in the work of several scientists who used it to account for discrepancies in the measurement of the gravitational constant.

In the upcoming *International Journal of Fusion Energy*, Dr. B.A. Soldano, professor of Physics at Furman University, offers a more fundamental explanation of this discrepancy, which entails a far more revolutionary challenge to accepted physics. He postulates that there is a difference between gravitational and inertial mass which accounts for Fischbach's results, but also accounts for many other so-called paradoxical findings which have been plaguing modern physicists. In his soon-to-be-published *IJFE* article, "The Lageos Satellite: A 'Laboratory' for Testing General and Special Relativity," he writes:

> For decades, a conflict has raged in physics over the question of the primacy of classical physics inherent in general relativity or of quantum mechanics. At present, physics maintains two parallel paths and occasionally attempts to interrelate these two conflicting disciplines.
>
> We take the position that an answer to the question of primacy already exists. Specifically, we propose to show that classical physics, slightly modified to accommodate a restricted non-equality between inertial and gravitational binding mass, leads to a purely classical explanation of the quantum h. Further, we propose to show that the seeds of a resolution of the above conflict already exist in the framework of both quantum mechanics and general relativity. . . .
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> In order to obtain accurate enough parameters for resolving a wide array of problems in both general relativity and quantum mechanics, we shall begin by demonstrating that the Lageos satellite constitutes an extremely sensitive "laboratory" for quantifying some of the parameters required by explanations based on nonequivalence in gravitational binding. [A gravitational binding force is the attractive self-energy of a nucleus—ed.]

From this, Dr. Soldano derives a definition of both inertial and gravitational mass. Lageos, NASA's geodynamic satellite, was placed in nearly circular orbit at approximately twice the radius of the Earth at approximately 110° inclination to the Earth's equator. This satellite is well above the Earth's ionosphere and is in a nearly perfect vacuum; nonetheless it is falling at a rate of 1.1 millimeters per day. *According to accepted theory, the satellite should not be falling.* Furthermore, the plane of the satellite is rotating. Both of these otherwise inexplicable results, as well as the Fischbach results, are explained by Soldano's non-equivalence theory.

Interview: Dr. B.A. Soldano

What follows is an interview which the authors conducted with Dr. Soldano on Jan. 17, regarding the relationship between his own work and the postulated "fifth force."

Dr. Soldano has taught physics for 15 years at Furman University. From 1949 to 1971, he was a researcher in chemistry, physics, and engineering at Oak Ridge National Laboratory. For the past two years, he has been a Goddard summer research fellow, under NASA's physics research program.

EIR: Dr. Soldano, can you explain what you mean by the difference between gravitational and inertial mass?

Dr. Soldano: There are only two properties of mass: first, that a given mass will attract all other mass, and that's called *gravitational mass*; and second, that mass resists change in motion, and this resistance to change in motion is called *inertial mass*. Now, these are two different properties of mass, but interestingly, when a substance falls, it can be "inerting" and "gravitating" at the same time.

Since these are two different properties, one would, without being told differently, assume that the values you would associate with inertial and gravitational mass would be different. The fact that—assuming they are in a vacuum—all things appear to fall to the ground with the same acceleration, is indirect proof that the inertial mass and the gravitational mass are one, and identically equal to each other.

EIR: Is this what Galileo showed when he asserted that things of different mass fell to the earth in the same amount of time?

Dr. Soldano: He proved that the inertial mass and the gravitational mass properties, appear to be identically equal to each other—which is contrary to reason, you would have thought. And Einstein, then, took this apparent equality, and he made it a principle—the so-called equivalence principle.

EIR: Can you describe how you came to develop your theory?

Dr. Soldano: About 25 years ago, I concluded that the central difficulty which Einstein had run into when he attempted to unify physics, was the fact that General Relativity could not describe, surprisingly, gravitational energy—of all things. It could handle all other forms of energy, but it couldn't handle gravitational energy. It ran into such problems as apparent violation of conservation of energy at the microscopic level, and it required a special model of the universe in order to fit a series of complications.

I concluded, upon analysis of General Relativity's in-