

PROJECT SUMMARY

Overview:

The proposed work will present and test a novel theory (fieldlet theory) regarding what fundamental electric charges and electric fields really are. This will require building a number of unique interferometers and conducting experiments that have never before been conducted. In one aspect, the proposed work may be considered a radical variation of the Michelson-Morley series of experiments that helped falsify the luminiferous aether. The variations are: (1) Seek to detect not the falsified luminiferous aether but rather a medium of light that is generated by the particles of the earth and that rotates with the earth. (2) Construct several rugged, mobile interferometers with the expectation of getting non-null results only when they are in motion over the earth's surface, such that they show their own velocity over the earth. (3) Increase their sensitivity by using the linear Sagnac effect and Fresnel-Fizeau-like dragging. Testing will be done in airplanes, trains, and automobiles. Faster speeds should be easier to detect.

Intellectual Merit:

The principle of superposition is used to compute the value of the vector field \mathbf{E} at any point in space. According to fieldlet theory, charges really do act directly upon one another, and they do so without an intermediate vector field \mathbf{E} . The electric influence of each charged particle is called a fieldlet. Fieldlets behave as an extension of their charge, extending out in all directions. With increasing distance, they decrease in strength according to Coulomb's law. They intersect other charges with virtually no distortion, so fieldlets cannot be blocked or shielded. All fieldlets overlap each other without losing their identity or merging. It is only when overlapping fieldlets act upon the same charged particle that their various force effects combine as a vector sum, which may result in the particle's acceleration exactly as superposition predicts. Fieldlet theory is almost functionally equivalent to classical field theory in that a test particle will always behave the same in both theories. However, according to fieldlet theory, it is not just the net charge that matters. The absolute value sum of all overlapping fieldlets matters also by causing other phenomena to emerge. These overlapping fieldlets may be the reality behind what Einstein in 1919 called the spacetime-ether. The electrical nature of fieldlets makes them the natural medium for light. They extend from both electrically charged and neutral matter, so their intensity is sufficient to extend between stars and galaxies. The earth's fieldlets dominate on its surface and create a medium for light that rotates with the earth. This explains the Michelson and Morley experiments' null results, and predicts that an improved and mobile version of that experiment can act as a vehicle velocimeter.

Broader Impacts:

If a velocimeter is successfully made, it is an objective to both publish papers and also to make such velocimeters widely available, hopefully creating a resurgence of interest in science and engineering. Such velocimeters could also improve the safety of airplanes. Being self-contained, they would serve as a sanity check on the pitot tubes and pressure sensors that are still in use and that have occasionally provided faulty information and caused airplane crashes. This work may also suggest how mass bends spacetime, which is still an open question. With positive and negative fieldlets overlapping without annihilating each other, the intensity of these fieldlets may slow things down, causing the effect that we perceive as gravitational time dilation. The intensity would mean that every fundamental charge on earth is experiencing trillions of tons of force both up and down in near-perfect balance. Finding a slight charge-neutral bias for attraction would be a new concept in emergent quantum gravity. For example, if in addition to the ordinary electrical vector forces of attraction and repulsion, every fundamental charge has a secondary effect on each individual fieldlet it intersects, slightly concentrating attractive ones because of the attraction and slightly diminishing repulsive ones because of the repulsion, such that the scalar strength of the primary vector force is affected accordingly, the end result would be an apparently charge neutral bias for attraction that cannot be shielded against. Gravity would then arise as an exception to the electrical neutrality of matter, because the absolute value scalar attraction between unlike charges always slightly exceeds the absolute value scalar repulsion between like charges of identical strength.