Ether, A Contrarian Perspective

Richard Murray Davis, 2019

1. Early Beliefs and Experiments

In the late 17th century Isaac Newton published his law of gravitation stating bodies attract each other with a force proportional to the product of their masses and inversely proportional to the square of the distance between them. Newton argued the force was due to pressure gradients in an invisible medium known as ether (historically aka aether). He called the ether particles corpuscles and used them to also explain the propagation of light.

In the early 19th century, Thomas Young split a beam of light at the output of a hole in a partition (apparently by just placing a card in back of the hole) producing a pattern of alternating light and dark areas on a screen behind the partition. The pattern resembled crests and troughs produced by two stones thrown into still water. The experiment proved light behaves like a wave and overturned Newton's particle theory. A few years later Young suggested the experiment could be performed using two closely spaced holes in the partition. It has since been known as the double-slit experiment.

If light was a wave, common sense said it must be carried by a medium like air which carried sound. The ether was the logical candidate. Many thought it was a stationary medium and would appear to be a wind as the earth traveled through it.

A *coup de grace* came in 1887 when Albert Abraham Michelson and Edward Morley (M&M) compared the time it took light to travel down and back two perpendicular paths. If the ether was stationary, the transit times should have differed due to changes in the direction of the earth as it rotated on its axis and traveled around the sun. Little change was observed. The outcome implied the ether was being dragged along by the earth.

Henrick Lorentz provided an explanation of M&M's experiment which did not require an ether. He hypothesized the lengths of moving objects are shorter in the direction of motion than when at rest. Lorentz's length contraction was later explained by Albert Einstein's Special Theory of Relativity. It appeared M&Ms experiment was just a demonstration of Special Relativity.

Equations derived by James Clark Maxwell in the 1860s and 1870s, would eventually be used to explain the propagation of light. The equations say all electromagnetic waves (not just light) are self-propagating. The math describes traveling waves bootstrapping themselves through space. Oscillating electric fields create oscillating magnetic fields and vice versa.

2. Ether and the Double-Slit with Particles

In 1927 Davisson and Germer performed a variation of the double-slit experiment using electrons instead of light. The interference pattern again appeared on the back screen, confirming Louis de Broglie's 1924 thesis that particles behave like waves.

The double-slit experiment has been repeated using atoms and molecules, always producing the interference pattern.

The double-slit became more confounding when the particles were fired one at a time. The interference pattern showed up again - after allowing it to build up. The particles appeared to be splitting, going through both slits then recombining as if they were waves.

The possibility of an ether explaining the double-slit has been debated in chat rooms. The argument apparently assumes the particles exiting the particle gun slam into the smaller ether particles launching a traveling wave which goes through both slits. The waves of particles exiting the slits add coherently (taking phase into account) on the back screen to produce the interference pattern. If a light source is used to observe the output of one of the slits the momentum of the photons may transfer to the ether particles exiting the slit, randomizing the phase of the wave, thereby destroying the interference pattern on the back screen.

3. Ether and Gravity

Newton's law of gravitation is unable to predict small variations in Mercury's orbit. In 1915 Einstein came to the rescue with his General Theory of Relativity. Instead of defining gravity as a force propagated between bodies, Einstein described it as a curvature of spacetime in the vicinity of large bodies. Modern theories of gravity are based upon quantum mechanics, the study of subatomic particles. One unproven theory assumes the force is due to the exchange of never-seen particles called gravitons.

Existing theories of gravity can't explain why stars circling black holes don't fly off into deep space. The attraction is too small. The disparity has been explained by hypothesizing the existence of dark matter, invisible particles. The inconvenient truth is that the particles must constitute roughly 85 percent of all matter in the universe.

S.A. Orlov has proposed a contrarian theory of gravity based upon the existence of an ether medium which contains vortices. The vortices create low-pressure regions near the center of rotation like those in hurricanes. Matter entering the vortex experiences an inward directed force due to the pressure gradient. Orlov uses an equation which describes the flow of fluids in viscous mediums to show the force is inversely proportional to the square of distance to the center of rotation. He argues vortices are responsible for creation of celestial bodies. Bigger vortices absorb more cosmic matter creating bigger planets. He suggests vortices may arise from thermodynamic processes.

Orlov's theory of gravitation is supported by the observation that all the planets travel around the sun in the direction of its rotation. Six of the eight planets spin on their axis in the same direction the sun rotates. The sun's equator spins at 2 kilometers per second, roughly 10 times that of the planets.

Orlov suggests distant galaxies may be moving away from each other, not because of the widely held belief the universe is expanding, but because they are being pulled by an ether vortex surrounding a large invisible black hole at the center.

4. Quantum Fluctuations

Physics postulates space is filled with vibrating energy fields referred to as quantum fluctuations. The fields can be modeled as virtual particles that fade in and out of existence but don't violate the first law of thermodynamics (energy cannot be created or destroyed) because they annihilate each other and exist for only a short time.

The existence of quantum fluctuations and dark matter, if not ether-based theories of the double-slit and gravity, bethink Einstein's words in his 1920 address *Ether and the Theory of Relativity,* "According to the General Theory of Relativity, space without ether is unthinkable".*

*** Richard hypothesizes an ether-based theory of clairvoyance in his science fiction thriller *BEAR*.**