

New look at relativity: Electrons can't exceed the speed of light -- thanks to light itself, says biologist

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When resolving why electrons can never beat the speed limit set by light, it might be best to forget about time. Thanks to insight from studying movement inside a biological cell, it seems that light itself -- not the relativity of time -- may be the traffic cop, according to a Cornell University biologist.

Any space with a temperature above [absolute zero](#) consists of [photons](#). As a result of the [Doppler effect](#), the moving electron experiences the photons crashing into the front of it as being blue-shifted, and the photons colliding with the back of it as being red-shifted. Since blue-shifted photons exert more momentum than red-shifted photons, the photons themselves exert a counterforce on the moving electron, just as the cytoplasm in a cell exerts a viscous force on the moving organelles. The viscous force that arises from the Doppler-shifted photons prevents electrons from exceeding the speed of light, according to Randy Wayne, associate professor of plant biology.

Wayne's research, "Charged Particles Are Prevented From Going Faster Than the Speed of Light by Light Itself: A Biophysical Cell Biologist's Contribution to Physics," appears in the November 2010 issue of *Acta Physica Polonica B*.

On determining whether electrons can surpass the speed of light, Albert Einstein's special [theory of relativity](#) contends that electrons are

prevented from exceeding the speed of light as a result of the relativity of time. But Wayne contends that Einstein didn't take the environment through which the [electrons](#) move into account.

"Given the prominence of viscous forces within and around cells and the experience of identifying and quantifying such resistive forces, biophysical cell biologists have a unique perspective in discovering the viscous forces that cause moving particles to respond to an applied force in a nonlinear manner," he explained. "Consequently, light itself prevents charged particles from moving faster than the [speed of light](#)."

Wayne will publish a related paper, "The Relativity of Simultaneity: An Analysis Based on the Properties of Electromagnetic Waves," in a forthcoming volume of the *African Physical Review*, which is a juried publication.

More information: Paper (PDF):
th-www.if.uj.edu.pl/acta/vol41/pdf/v41p2297.pdf

Provided by Cornell University

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