

## The Speed of Space<sup>1</sup>

Einstein deduced the speed of light from how the world behaves, but *why* it was so he didn't say<sup>2</sup>:

“... *the speed of light is a constant because it just is, and because light is not made of anything simpler.*” (Laughlin, 2005) p15

In quantum realism, the speed of light is the grid processing rate. The “speed” of a processor is its cycle rate, e.g. a 5GHz computer runs 5,000,000,000 cycles per second. If light travels from one network node to the next each cycle, its speed depends on the speed of the network. The speed of light is a property of the grid network, not an arbitrary parameter<sup>3</sup>.

If the speed of light in a vacuum is defined by the network generating the virtual reality, why does light go slower in water? If light moves in water we *say* the medium is water and if it moves in glass we *say* the medium is glass, but when it moves in empty space what then? Is it a wave of nothing? In quantum realism, whether light moves in glass, water or empty space, the medium is always the grid. If it also has to process glass or water matter, the transmission of light will slow down, just as the frame-rate of a computer game drops when the computer is busy doing other things.

The grid as a network with a common cycle rate also keeps photons in strict sequence, one behind the other, like the baggage cars of a train driven by one engine. Each node has to pass on the photon it has in order to accept another in the line. If the engine slows down under load say near a massive star, the photons go slower *but still keep the same order*. So in gravity lensing, photons from a cosmic event arrive on earth at different times by different paths, but are still in lock-step order for each path. This maintains causality, as if one photon could overtake another one could see an object arrive before it left! Temporal causality requires photons to stay in sequence and the grid's processing cycles rigorously maintain this.

The effortless transmission of light contrasts with the movement of matter in Chapter 5. While matter needs energy to *start* its motion, light needs energy to *stop*. The speed of light as a property of the grid transmitting it is actually the *speed of space*.

Laughlin, R. B. (2005). *A Different Universe: Reinventing physics from the bottom down*. New York: Basic Books.

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<sup>1</sup> This is section 3.2.4 from Chapter 3 [The Light of Existence](#), of the forthcoming book Quantum Realism by Brian Whitworth. The link gives a free early access to the whole chapter. This work is ©Brian Whitworth 2014 but shared under a [Creative Commons Attribution-Noncommercial license](#).

<sup>2</sup> Saying a photon goes at light speed because it has no mass doesn't explain why there is a maximum speed at all. Why not the speed of light plus one? But a virtual processor with a finite cycle rate will limit node transfers.

<sup>3</sup> In quantum realism, the speed of light  $c=L_P/T_P$ , where  $L_P$  is a Planck length of  $1.616\times 10^{-35}$ , and  $T_P$  is Planck time of  $5.39 \times 10^{-44}$  seconds. The result of 299,792,458 meters per second is the speed of light (see [here](#)).